basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

REPORT ON THE 2019 NATIONAL SENIOR CERTIFICATE DIAGNOSTIC REPORT

PART 1

Let's grow South Africa together

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Foreword from the Minister

The Class of 2019 sat for the National Senior Certificate (NSC) examinations in a year that our great nation celebrated 25 years of democracy, constituted the sixth democratic parliament and South Africans united in celebrating yet another Rugby World Cup victory. In his State of the Nation Address, the President of the Republic of South Africa, the honorable Cyril Matamela Ramaphosa highlighted education as one of the seven priorities of the new administration.

The gradual improvement in the basic education system is affirmed by a 3.1% increase in the NSC pass rate from 78.2% in 2018 to 81.3% in 2019. The cornerstone of the democratic era has been an improving education system committed to the pursuit of quality basic education, the necessary raising of standards and careful introspection of progress. Government's strategy of improving basic education quality has been articulated in the National Development Plan (NDP) Vision 2030: Our future – Make it work.

In this regard, the education sector has listed eleven priorities for this administration, which include inter alia, improving the foundational skills of literacy and numeracy; implementation of a curriculum with skills and competencies for a changing world; dealing decisively with the quality and efficiency through the implementation of standardised assessments; urgent implementation of the two-years of Early Childhood Development before Grade 1, promoting school safety, health and social cohesion and completing an integrated Infrastructure Development Plan.

It is against these priorities and noting that the education enterprise is a highly complex activity where the outcome is based on a multiplicity of factors, that we use the National Senior Certificate examination results, as one of the barometers to evaluate our success. There are noteworthy signs of progress as observed in the recent cycles of international and regional assessment programmes.

In terms of the Action Plan of the Department of Basic Education (DBE), the following three key targets are directly measured through the performance in the National Senior Certificate:

(a) Increase the number of Grade 12 learners who become eligible for a Bachelor's Programme at a university;

(b) Increase the number of Grade 12 learners who pass Mathematics; and

(c) Increase the number of Grade 12 learners who pass Physical Science.

I am pleased to release the 2019 National Diagnostic Report on Learner Performance. This report is in its ninth year of publication and serves as a comprehensive analysis of candidates' performance in the NSC Examinations.

In the State of the Nation Address the President pointed out that there is a need to improve the capabilities of teachers. 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, the twelve (12) official home languages, the Technologies and Technical subjects currently offered in the NSC examinations.

For the third time, the Department of Basic Education (DBE) is offering a detailed analysis of learners' performance in each of the official home languages.

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Foreword from the Minister (Continued)

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 prepared, post the writing of the 2019 NSC examinations have been used to identify strengths and weaknesses in candidates' knowledge and skills.

This diagnostic report is presented in three parts. Part 1 comprises the diagnostic reports of the ten key subjects, Part 2 contains the diagnostic reports for English First Additional Language and the twelve home languages and Part 3 includes the diagnostic reports for Technical subjects and Technologies.

In the 2019 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 shows 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 2020.

MRS AM MOTSHEKGA, MP
MINISTER OF BASIC EDUCATION
08 JANUARY 2020

Chapter 1

1.1. INTRODUCTION, SCOPE AND PURPOSE

The Class of 2019 is the sixth cohort that sat for the NSC examinations based on *the CAPS*. In line with past reports, the 2019 Diagnostic Report illuminates key observations in learner performance. One of the primary objectives of this report is to serve as a teaching and learning resource tool in the ten high enrolment subjects, English First Additional Language, the twelve official home languages, the Technologies and Technical subjects. It is essential that the 2019 diagnostic report should be used in conjunction with the 2014 to 2018 diagnostic reports. Key subject didactic principles and content matters addressed in past reports can be used fruitfully in the classroom in 2020.

Post the marking process, the chief markers, internal moderators and subject specialists compiles subject reports that outline qualitative data. This diagnostic report is based on this data. In the ten 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. This qualitative and quantitative data highlight the areas of weakness in each of the identified subjects and articulate the remedial measures to be adopted at school level to improve performance in these subjects. 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.

Each subject's diagnostic report commences by presenting comparative data on the performance trends observed over a five-year period in the subject, from 2015 to 2019. In the ten key subjects and English First Additional Language, it also provides an overall performance of candidates per question, in the respective question papers, in each subject. In all subjects, common errors, misinterpretations and misconceptions identified during marking and suggestions for improvement are also outlined.

In 2019 it was observed, once again, that the poor quality of answers provided by some candidates in certain subjects suggest gaps in the scope of content coverage and teaching methodology. Given this, attempts have been made to track progress made in the subject and in content areas which were highlighted as problematic in previous years. It is these recurrent areas of weakness that must become the baseline for intervention by the Subject Advisory Services in the new academic year. In essence, progress or lack thereof, in the said areas, should determine the extent to which further interventions are necessary in 2020. 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. Given that this report is a key teaching and learning resource, the aim is that it will be used effectively by every Grade 12 teacher and subject advisor in 2020. Subject advisors are encouraged to mediate this key resource in their workshops with teachers 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.

The DBE and Provincial Education Departments (PEDs) will monitor the distribution and utilisation of this report and feedback from teachers and subject advisors on the usefulness of these reports.

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/sub-question under the following three main titles:

Section 1: Performance Trends (2015 – 2019)

A comparative analysis of the performance of learners 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, is presented in this section. 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 graphically present the distribution of learner scores in the last three examinations. Any improvement or decline in the performance can be observed from the position of the 2019 graph, relative to previous years. If the 2019 graph lies to the right of the two previous graphs, this 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 makes reference 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;
- Suggestions for improvement in relation to teaching and learning, content and methodology, subject advisory support and provision, and utilisation of LTSM.

The internal moderators' reports from all nine provinces for each question paper, per subject were consolidated and the findings are summarised in this report. It is recommended that this report be read in conjunction with the November 2019 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 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 2019 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.

The diagnostic analysis of learner performance in this publication is only limited to the ten subjects with high Grade 12 enrolments, English First Additional Language and the twelve official home languages, the Technologies and Technical subjects. 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.

1.4   GENERAL FINDINGS AND AREAS OF CONCERN

The 2019 diagnostic reports for the ten key subjects covered in this publication (Part 1), indicate that the pass rate has improved in five (7) of these subjects (Accounting, Agricultural Sciences, Business Studies, Geography, History, Mathematical Literacy and Physical Sciences) at the 30% levels. The pass rate has however declined to varying degrees at the 30% level in Economics, Mathematics and Life Sciences. The pass rate for English First Additional Language improved at the 30% level and at the 40% level. In the home languages (Part 2) the pass rate has improved at the 40% level in isiNdebele, isiZulu and South African Sign Language; remained the same in two home languages (isiXhosa and Tshivenda) and declined to varying degrees in Seven (7) home languages (Afrikaans, English, Sepedi, Sesotho, Setswana, SiSwati and Xitsonga).

After 6 years of 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 learners' responses in the 2019 NSC examinations. Moreover, it is imperative that we reflect on and learn from the performance of candidates of the 2019 NSC examinations.

The following areas of concern were identified in past diagnostic reports and they are, once again, highlighted as concerns in the 2019 NSC examinations.

- There was a general observation that not all topics were equally covered in preparation for examinations. It is essential that all prescribed topics in the *CAPS* are studied and that there is adherence to the examination guidelines.
- SASL HL, Technical Sciences, Technical Mathematics and the technologies were offered for the second year in the Grade 12 NSC examinations. It can be deduced from candidates' responses that focused intervention strategies need to be initiated and implemented to ensure that candidates have a solid understanding of the new topics.

- In most home languages, the vast majority of candidates either misinterpreted or gave limited responses to higher order questions in Paper 1 and Paper 2. There is therefore a need to enhance thinking in an abstract context in languages. Challenging topics need to be included in classroom and homework exercises to allow learners to get accustomed to employing critical language skills to think analytically and critically.
- It was further noted that, in most languages, candidates did not understand the vocabulary used in comprehension texts. In view of this, teachers are encouraged to expose learners to a wide array of texts to build their vocabulary, improve their comprehension skills and sharpen their critical thinking skills. Vocabulary exercises and reading need to be promoted in schools.
- Informal writing must be taught as per the *CAPS* prescripts. Learners writing skills will improve if informal writing activities become part of classroom and homework activities.
- A large percentage of candidates displayed a limited understanding of subject matter, and specifically complicated topics. This diagnostic report is geared towards addressing these concerns.
- Although candidates performed well in questions that required lower order thinking skills, many learners 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.

1.5. KEY RECOMMENDATIONS

1.5.1   Diagnostic Reports from 2014 to 2019

The diagnostic reports published from 2014 to 2019 are pertinent to gain a holistic grasp of learners' performance and to identify weaknesses in the teaching and learning of the ten key subjects (Part 1). Part 2 of this diagnostic report, published for the first time in 2017, will serve as a teaching and learning tool in the language classroom. Part 1, Part 2 and Part 3 must be used in preparing the Class of 2020 for the NSC examinations.

1.5.2   Past question papers

Teachers are discouraged from teaching to the paper. However, past question papers should be used as a teaching and learning resource. 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.

1.5.3   Language in teaching

It must be stressed that language across the curriculum is a central part of the learning experience. Teachers across all subjects are encouraged to work collaboratively to integrate a school-based language strategy that aims to improve learner performance. The language classroom is not the only context where learners can improve their language skills. 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:

- There needs to be greater emphasis on aspects of language competence and examination technique. Candidates often have the ability to respond appropriately to questions but inadequate language skills and a solid understanding of examination techniques impact negatively in their performance.
- In view of the point above, 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.
- 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. It is suggested that a glossary of subject specific jargon and their definitions is provided to learners.
- Language and comprehension skills must be developed in each classroom, across subjects.

1.5.4   Integrated intervention strategies

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

- Learners and teachers can gain access to online learning platforms such as YouTube that offer visual presentations and explanations of challenging topics. Teachers and subject specialists can source video clips and incorporate these in their lessons to give learners a clear understanding of subject matter.
- Teachers from different schools in a given circuit or district could collaborate to support one another in mediating challenging topics to learners.
- Challenging topics must be revisited regularly during the course of the academic year. Stronger candidates can be paired with weaker candidates to complete assignments on challenging topics.
- Study groups could be formed to facilitate revision activities and examination preparations.
- 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:

- Given that the target audience of this report include the teacher and learner, this report must be cascaded from the provincial to the district level and finally to the school.

Subject Advisors and district officials:

- Subject advisers are encouraged to convene meetings/workshops that aim to mediate this diagnostic report. It is further suggested that the use of this diagnostic report must encouraged during 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 would 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. They also provide an opportunity for the teaching and learning interventions to gain traction well before the NSC Examinations.

Teachers:

- In order to develop learners' holistic understanding and applied competence, teachers must prepare learners adequately by creating learning opportunities to reflect, analyse and evaluate the content.
- Teachers should ensure coverage of the curriculum and the full range of cognitive levels in their teaching and assessment strategies. The mere recall of procedures or specific content on the part of learners will not enable them to respond fully to the demands of the question paper.
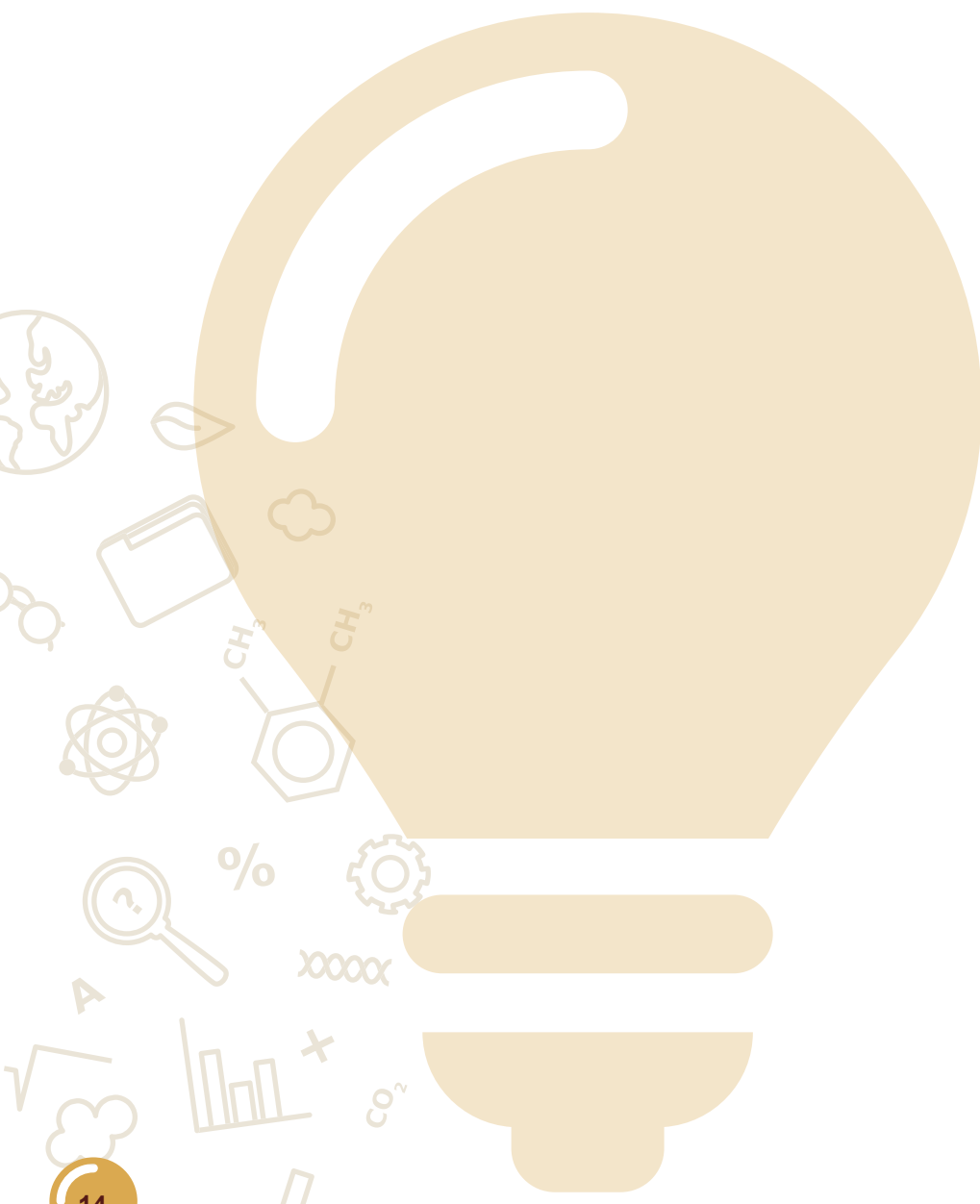
Chapter 2

ACCOUNTING

The following report should be read in conjunction with the Accounting question paper of the November 2019 Examinations.

2.1 PERFORMANCE TRENDS (2015–2019)

Enrolment for the 2019 Accounting examination reflected a decrease of 10 168 candidates when compared to that of 2018. The performance of candidates, however, shows a significant improvement as indicated by 78,4% achieving at the 30% level, with 52,6% 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
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
2019	80 110	62 796	78,4	42 113	52,6

While the decline in the enrolment is a concern, the past three years show encouraging general improvement in the overall results. In comparison to pass rates of five years ago, the improvement in the pass rates by more than 18 percentage points is most significant.

In the quest to improve results, intervention strategies by teachers and subject advisors tended to focus on the more predictable content and in the newer and challenging topics, such as the Repurchase of Shares, Stock Valuation Methods, Interpretation and Problem-solving. However, it remains a concern that Grade 10 and 11 topics, such as Bank Reconciliations, Fixed Assets, Budgeting and Financial Indicators might not receive adequate revision, thereby disadvantaging weaker candidates in particular.

Graph 2.1.1 Overall Achievement Rates in Accounting (Percentage)

	2015	2016	2017	2018	2019
■ % achieved at 30% and above	59.6	69.5	66.1	72.5	78.4
■ % achieved at 40% and above	36.2	44.9	42.6	48.6	52.6
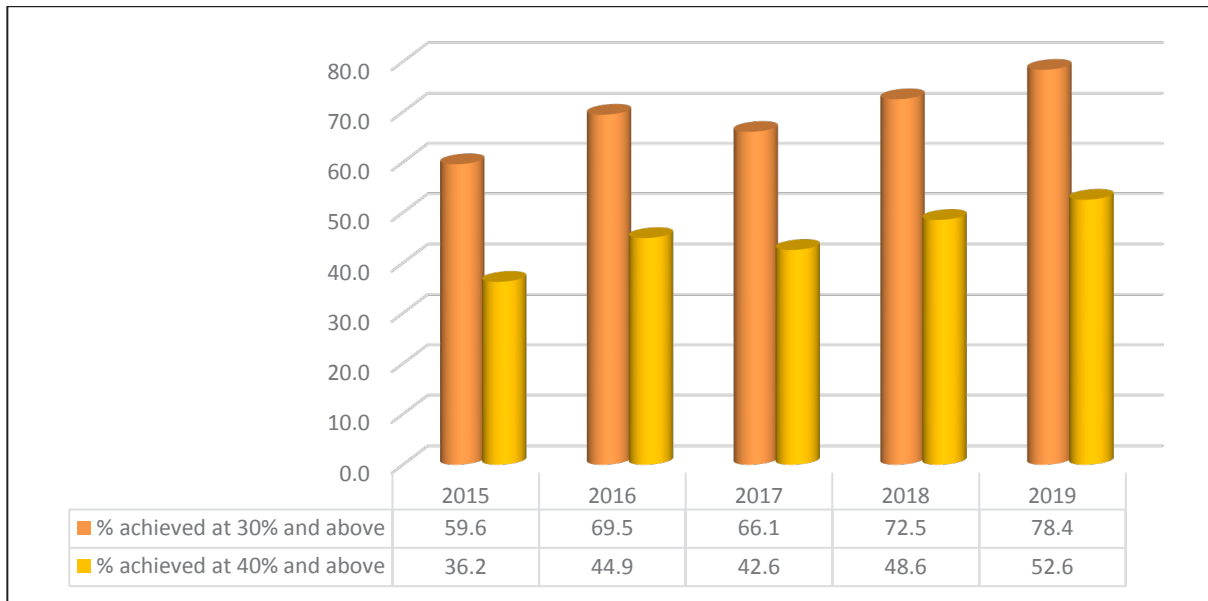
Graph 2.1.2 Performance Distribution Curves in Accounting (Percentage)

	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
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
2019	0.3	5.3	16.0	25.8	20.1	12.9	8.5	6.2	3.9	1.0
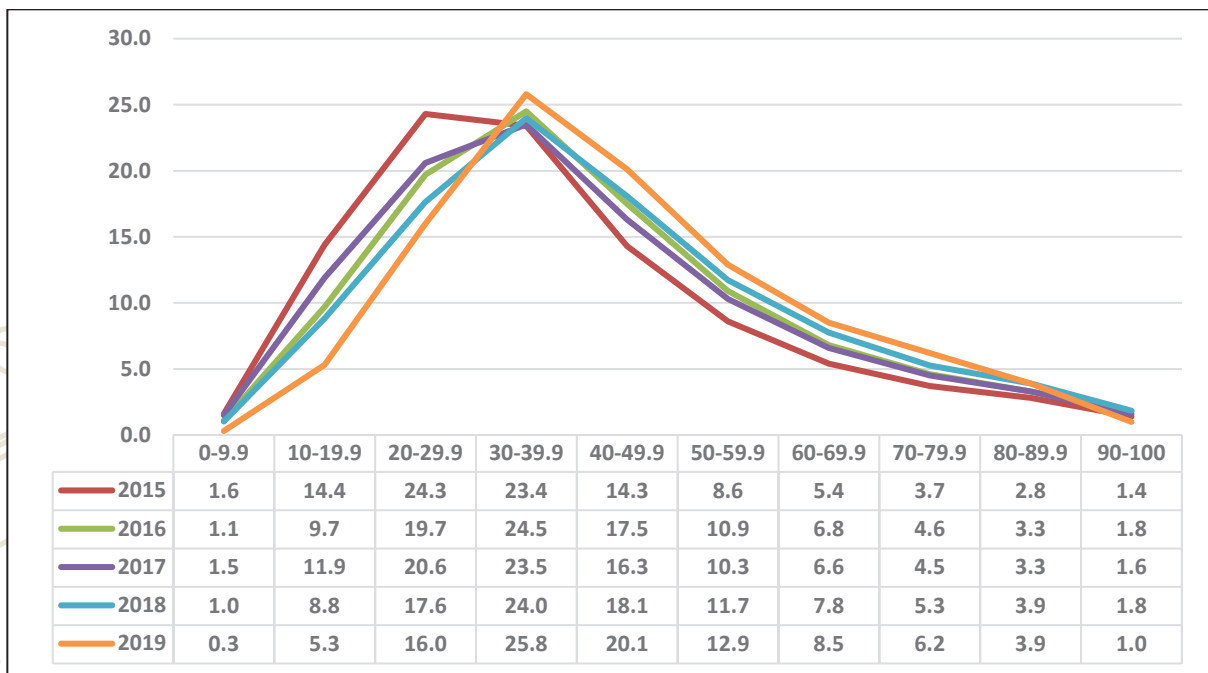
2.2. OVERVIEW OF LEARNER PERFORMANCE

The following comments provide an overview of the advice given to Accounting teachers in previous diagnostic reports. Teachers are, nonetheless, advised to refresh their strategies by referring to previous editions of these reports, as the advice contained therein remains relevant.

General Comments

(a) **Quality of candidates' performance**

- The 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 and strategies proposed in previous diagnostic reports. These candidates have illustrated the ability to address the requirements of the subquestions, to extract and use the relevant information appropriately and to manage their time effectively.

- All questions in the Accounting papers are designed to be accessible to all candidates, at least in part. The inability of weaker candidates to deal effectively with even the less challenging parts of questions is a clear indication of deficiencies in the teaching and learning processes. If basic concepts and procedures are not being addressed properly at an early stage, this will subsequently impact negatively on examination performance.

(b) **Policy documents and LTSM:** It is essential that every teacher is in possession of the revised *CAPS* document, the latest Examination Guidelines, textbooks, study guides and publications such as *Mind the Gap*. These must form the basis of the planning process and must be used to monitor and support progress on an ongoing basis.

(c) **Use of past NSC papers:** Past question papers serve as one of many teaching and learning resources and must be incorporated in the planning process. Every learner must have access to past examination papers, especially from November 2014 onwards, as these are based on the current *CAPS* content. NSC Accounting question papers since 2008 have strived to cover all topics outlined in the *CAPS*, and as such, provide a reliable trend on questioning patterns and style. Innovations were gradually introduced as part of the higher-order component to ensure that the subject remains relevant and reflects modern trends.

(d) **Future NSC Accounting papers**

- The 2020 Accounting NSC examination will involve a migration to two papers:

	DISCIPLINES	MARKS	TIME
Paper 1	Financial reporting & evaluation	150	2 hours
Paper 2	Managerial accounting, internal auditing & control	150	2 hours

The amended Accounting *CAPS* and 2020 Accounting Examination Guidelines will provide details of topics and financial indicators relevant to each paper.

- To relieve unnecessary pressure on candidates, topics are allocated to each paper to ensure that the question papers will be written on different days.

- The migration to two papers does not necessitate changes to the content of topics, textbooks or the annual teaching plan (ATP). Together with the many past examination question papers, candidates and teachers still have access to extensive resource material, which remains relevant in preparing for the November 2020 question papers.

(e) **Pertinent factors from previous diagnostic reports**

The poor results in many centres have exposed the fact that challenges in teaching and learning are still prevalent. The following factors mentioned in previous diagnostic reports continue to be identified as reasons for poor performance:

- **Poor mathematical and arithmetical ability:** Arithmetical calculations, such as percentages and ratios, will feature across all topics in an Accounting paper. At times candidates may also be required to formulate simple equations to calculate specific amounts. This includes the correct use for rands/cents, positive, negative or percentage signs and the appropriate operations. An Accounting learner is expected to have a good understanding of the logic of these calculations. This skill is developed over time with regular practice.

- **Language barriers linked with poor comprehension skills:** Many candidates find it difficult to understand and address the requirements of questions adequately. Responses in several subquestions are not in line with the requirements of the questions. Weaker candidates provide incomplete or unclear responses to questions requiring explanations or comments and often quote commonly used clichés found in previous marking guidelines in situations where they are not relevant.

- **Inability to identify relevant information to answer specific subquestions:** The standard structure of an Accounting question will list what is *required* first, followed by all the *information* needed to answer the questions. Candidates are expected to sift through and extract the relevant information as required. Weaker candidates find this very challenging, often using inappropriate figures. In commenting, they tend to provide less important or immaterial information in supporting their explanations, while ignoring significantly more relevant and pertinent information.

- **Lack of meaningful revision of relevant Grade 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 reteaching of these topics. It is advised that weaker 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.

- **Lack of formative testing:** Teachers are expected to plan and implement an informal assessment programme to support the formal assessment tasks. Short, formative tests must be used to build learners' confidence in all topics. Self-marking or peer-marking is effective in providing immediate feedback. Learners will also gain an understanding of the mark allocation and be able to promptly identify errors or valid alternative responses. Less challenging subquestions (appetisers) of each question in the NSC Accounting question papers can be used as 'confidence-boosters' in this regard.

General Suggestions for Improvement

Teachers are expected to plan before the school year starts, due to the limited instruction time in each term. It is essential that they build the following practices into their work plans:

(a) **Comments, explanations and evidence:** Teachers need to address the language barriers as part of the English across the curriculum (EAC) initiative.

- Due to the specific nature of the subject, learners must be informed that explanations in Accounting should be to the point and must answer the question.

- Although questions will often require figures or other evidence to be quoted from the information provided, language proficiency should not be seen as an obstacle in presenting complete responses. Often poor or incorrect answers result from learners not taking note of the specific requirements of questions. This is a common problem in current times when skim-reading off screens is a widespread habit.

- Teachers are advised to repeat the process of interpreting and analysing a structured examination question with their classes at appropriate times during the Grade 10–12 academic years as follows: (1) Read each word of the instruction with the learners. (2) Underline key words. (3) Identify where the relevant source information is placed. (4) Ask learners to explain what they have to do to answer the question.

- Learners may use bullet points to clarify separate points, but partial, simple or single-word responses will not be sufficient if an explanation is required. Learners must also understand that unnecessary embellishment is time-consuming and will not earn additional marks.

- The establishment of co-curricular collaborative learning activities involving verbal and visual communication between learners is strongly advised. The benefit of this strategy should be reinforced by brief collaboration sessions in the classroom. This will provide learners with experience in using subject-specific terminology and will serve to clarify their understanding of concepts and topics when they explain these and get responses from others.

(b) **Time management:** Training on time management must be an ongoing 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.

(c) **Appropriate use of the printed answer book:** Teachers must instruct learners to read questions in the question paper to ensure that they comply with the requirements of each question. Learners must understand that the printed answer book is provided merely to assist them in structuring their responses and to guide them in appropriately placing their answer. The answer book should not be relied upon to replicate all aspects of questions. The space provided for each subquestion in the answer book would be appropriate to the extent of expected responses. For example, a 10-mark question would usually be allocated more space in the answer book than a 4-mark question. Examiners have noticed in the past that capable candidates might provide more comments and explanations than subquestions might demand, and that this will negatively impact on their ability to complete a paper.

(d) **Ethical and internal control issues:** The ATP stipulates that these important topics be integrated across all topics at relevant and strategic points, when or after the logic and application of accounting processes in each topic is covered in Grades 10–12.

- Business ethics and controls have become extremely newsworthy, and it is essential for teachers to expose learners to real-life scenarios that involve problems affecting businesses today. These include weak internal controls, bribery, corruption, lack of accountability, auditing irregularities, delinquent directorship and poor corporate governance.

- Teachers are strongly advised to use real-life scenarios in encouraging discussion and debate on these issues in the classroom. This should be done on a continuous basis as and when topical issues arise. These issues should also be reinforced in assessment tasks.

- Many experts on generation theory note that the post-millennial generation (Generation Z) currently reflected in school classrooms is the most diverse and well-informed generation the world has known. They are growing up in a world of social, political and financial turmoil and rapidly changing and disruptive technology.

- This generation is known to be more prudent than previous generations and is prepared to take a stand on issues affecting their environments, as is evidenced by world-famous teenage post-millennials, such as Malala Yousafzai (Pakistani education activist and 2014 Nobel Peace Prize laureate) and Greta Thunburg (Swedish environmental activist and *Time* magazine Person of the Year 2019).

- An awareness and understanding of the ethical and governance issues prevalent today and how these issues should be solved are vital in contributing to successful career futures of post-millennials.

- Teachers must not underestimate the positive influence they can have through the topic of Business Ethics in the Accounting *CAPS*.

(e) **Essential prior knowledge:** The teaching of every topic should commence by revising or introducing the basic concepts and terminology pertaining to that topic to ensure that learners are enabled to construct connections between old and new knowledge. Two of the most basic and vital components of prior knowledge in Accounting that must be regularly reinforced are:

- **The expanded accounting equation:**
  Assets + **E**xpenses + **D**rawings = **C**apital + **I**ncome + **L**iabilities
  The process of conceptualising and understanding these items is more than merely rote-learning definitions. Concrete and practical examples must be constantly provided to further enhance understanding of these concepts.

- **The structure and formats of financial statements and their progression from Grade 10:**
  Learners must be able to identify and explain differences between the main financial statements (see below), as well as differences between Balance Sheet items (i.e. capital items) and nominal items (i.e. revenue and expense items); categories or sections of the Income Statement and Balance Sheet; and operating, financing and investing activities.

(f) **The benefit of instilling a questioning approach in Financial Accounting:** Examination papers might reflect new and innovative ways of extending candidates' insight on financial statements and information that falls within the scope of the syllabus. The following points of advice are intended to enable learners to prepare, analyse, interpret and evaluate the different financial statements more effectively.

- The skill of obtaining valid information on a variety of questioning techniques in preparing and interpreting Financial Accounting information will be enhanced through the use of previous examination papers.

- Teachers are strongly advised to devote time in class to focusing on the purpose and inter-relationship of the four main components of financial information provided in a question of this nature. This is to assist learners in developing 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
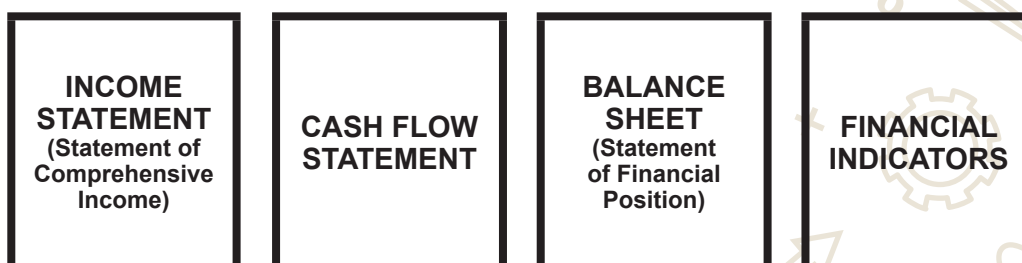
- A questioning approach, with class collaboration, starting from the basic purposes of the various documents should be used, developing to further reflection on the specific information provided or needed. Examples of questions that should generate understanding of this financial information are:

  - *What is the purpose of each of the above statements and indicators?* Learners should appreciate links between the three financial statements, e.g. Sales is 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.
  - *Where in the statement(s) would the following information be found?*

    Non-current & current assets   Income tax due & payable

    Non-current & current liabilities   Financial gearing & risk

    Income & expenditure   Share capital & retained income

    Investments & interest earned   Earnings & dividends

    Loans, repayments & interest   Cash resources

    Unsold stock & holding period

- 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 interconnected set of financial statements.

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
The question paper was not regarded as predictable. Well-prepared candidates coped admirably across all
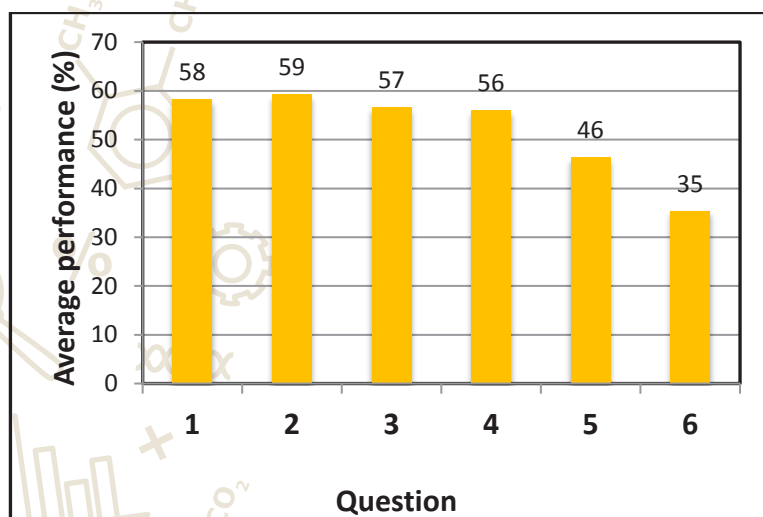
Q	Topic/Aspects
Q1	Manufacturing
Q2	Reconciliation
Q3	Inventory Valuation
Q4	Balance Sheet & Audit Report
Q5	Cash Flow Statement & Interpretation
Q6	Budgeting

questions and weaker candidates were able to take advantage of the marks on offer in the lower- and middle-order ranges. Weaknesses and challenges in most subtopics appear to have been addressed to some degree.

However, under-achievement in certain areas continues to be noticed, particularly Bank Reconciliation (Q2.2–Q2.4), preparation of a company Balance Sheet (Q4.2.4) and Interpretation of Financial Information (Q5.3). Performance in Budgeting (Q6) was largely affected by poor time management by candidates in the previous questions.

The change in contexts of certain subquestions appeared to increase the challenge for candidates who clearly prefer straight-forward and predictable questions that are identical to those of previous papers. Examples of these subquestions were: calculation of profit on extra units (Q1.2.3; 4 marks), Business Ethics (Q3.6; 6 marks), Disclaimer Audit Report (Q4.3; 6 marks), evaluation of EPS (Q5.3.3; 5 marks) and figures for Cash Budget & Projected Income Statement (Q6.1; 11 marks).

Graph 2.3.2   Average Performance per Subquestion Expressed as a Percentage
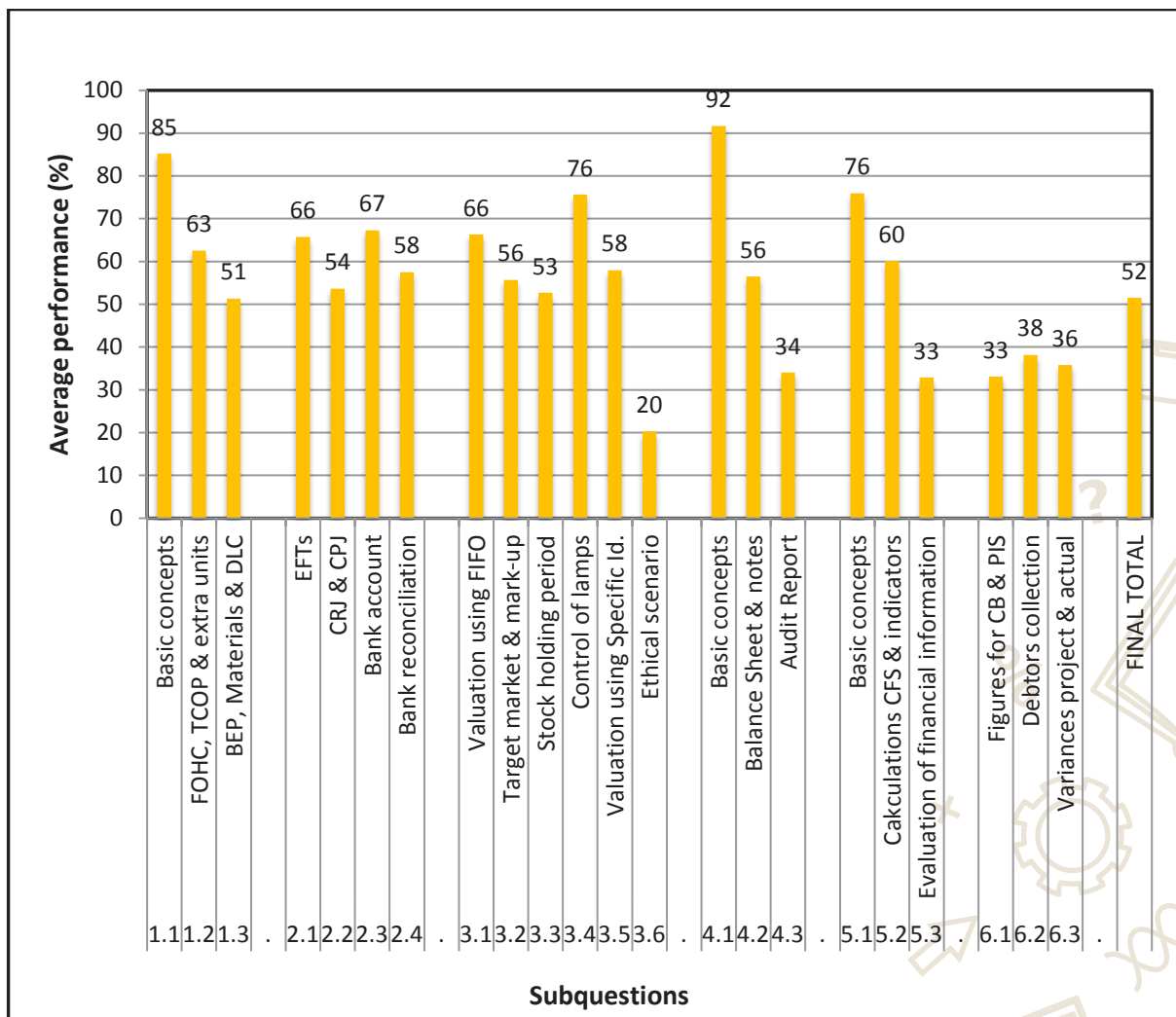
2.4 ANALYSIS OF LEARNER PERFORMANCE IN INDIVIDUAL QUESTIONS

QUESTION 1: MANUFACTURING

Candidates generally 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 Factory Overhead Cost (Q1.2.1; 8 marks) and for calculating the total cost of production that would appear in a Production Cost Statement (Q1.2.2; 5 marks). The break-even point (Q1.3.1; 4 marks) was correctly calculated by many candidates and they were also able to comment appropriately on the level of production achieved in relation to the BEP (Q1.3.2; 4 marks).

Candidates were proficient in offering valid reasons for the increase in direct labour cost per unit (Q1.3.4; 4 marks). This is not regarded as a challenging question as predictable responses found in many past years' examination papers also applied in this context. However, it was encouraging that certain candidates revealed creativity in their responses, e.g. by providing ghost employees as a possible reason for the increase in cost and the use of biometrics as a solution.

Common Errors and Misconceptions

(a)   In completing the Factory Overhead Cost Note (Q1.2.1; 8 marks), weaker candidates earned only part-marks because they were unable to separate the portion of costs applicable to the factory by applying the ratios or percentages to exclude costs of the administration and sales divisions. Many also included the advertising expense and lost a mark for foreign items. These issues were highlighted in previous diagnostic reports.

(b)   Calculating the total cost of production (Q1.2.2; 5 marks) basically replicates the composition of the Work-In-Progress Stock Account, which is Grade 11 content. It included the transfer of a figure and a simple calculation using a unit cost. It is a concern that many candidates could not earn full marks here, as all previous examination papers required them to calculate this amount in completing Production Cost Statements. Other approaches involve using the number of units produced, multiplied by the unit cost or completing the Finished Goods Stock Account to calculate this figure.

(c)   Calculating the additional profit (Q1.2.3; 4 marks) is regarded as a more challenging and analytical subquestion aligned to the concept of the break-even point. However, the calculation itself should be relatively simple because candidates were expected to know that the only factors affecting the production of extra units are the selling price and the variable cost per unit. The 4 marks allocated to this subquestion were as follows: number of extra units (1 mark) multiplied by selling price (1 mark), less variable cost per unit (1 mark), with a method mark on the answer (for one part correct). It was therefore possible for weaker candidates to earn 2 of the 4 marks without understanding the concept of contribution per unit (i.e. selling price less variable cost per unit). Many candidates, however, did not understand the 'short-cut' method of using unit costs to do this calculation. Instead, they used a variety of unnecessarily complicated and time-consuming procedures, such as working out total costs and figures that would appear in the Production Cost Statement and Abridged Income Statement. This would have significantly affected their ability to complete this question in the suggested time frame.

(d)   Calculating and commenting on the break-even point (Q1.3.1 and Q1.3.2) were generally well done. In Q1.3.2 (4 marks), weaker candidates did not recognise that the business was making a loss. Candidates were required to comment on both the break-even point and the level of production; however, many candidates mentioned only one of these factors. It is acknowledged that a comment should encapsulate both factors, e.g. by mentioning the difference between the break-even point and the number of units produced.

(e)   In Q1.3.3 (8 marks), most candidates were able to provide valid figures to prove the lack of control over raw materials (4 marks) and to identify possible reasons for the wastage (4 marks). A variety of basic arithmetic calculations or comparisons was accepted in this question, which afforded candidates the opportunity to earn at least part-marks.

(f)   In Q1.3.4 (4 marks), many of the weaker candidates were unable to provide two distinctly separate reasons for the increase in direct labour cost. It should also be noted that the employment of additional workers was not accepted as a valid reason as this will only lead to an increase in direct labour cost per unit if the extra workers are inefficient or unproductive.

Suggestions for Improvement

(a)   As mentioned in the 2018 report, this topic contained a limited portion 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 expose them to the different questioning techniques on this topic.

(b)   Teachers should also remind learners of the skills learnt in Mathematics or Mathematical Literacy, particularly skills in using fractions, ratios and/or percentages to calculate costs per component or department. The calculation of the wastage of raw material (Q1.3.3) is also an example of a scenario that would serve as a discussion task in small groups where learners could share ideas on the different options of assessing a practical problem such as this.

(c)   Inappropriate calculations observed in the Factory Overhead Cost Note revealed that further emphasis will have to be placed on improving the calculation skills mentioned above, particularly for weaker learners. 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. Short formative tests on these specific aspects of the topic will serve as useful revision of work covered in Grades 10 and 11.

(d)   Learners tend to find it easy to prepare a Production Cost Statement which reflects the cost of production of finished goods. It was therefore surprising that more of them were not able to earn full marks on the calculation of this cost in Q1.2.2. This seems to indicate that learners might be mechanically preparing the statement in class without appreciating the concepts contained therein. Teachers are advised to reinforce learners' understanding of the items in the Production Cost Statement at every available opportunity, to require learners to verbally express these items and their translation into unit costs and to use pie graphs to visually illustrate the components.

(e)   Diagrams, video presentations and demonstrations could be used to illustrate the relationship between the main components in a manufacturing entity, i.e. Factory, Administration and Sales. In this way, learners should be better equipped to understand the manufacturing process and the different calculations relevant to each component or department. Consequently, this should enable them to make more well-informed interpretations of the unit costs and break-even point.

(f)   Teachers are strongly advised to provide additional tasks on the interpretation of unit costs and how to use unit costs to identify problems or economies of scale and to predict future results. In so doing, learners should realise that it is not necessary to prepare a full set of total income and costs to arrive at conclusions about a manufacturing concern.

(g)   Most learners understand that the calculation of the break-even point involves the use of total fixed costs, the selling price and the variable costs per unit; however, they appeared unable to translate this knowledge in Q1.2.3 in predicting the additional profit on the extra 1 500 units. The many diverse methods used in this question indicates that learners generally did not appreciate the concept of contribution per unit, i.e. selling price less variable cost per unit. Learners should have a conceptual understanding that, as fixed costs remain constant for a period of time, the extra benefit of producing and selling more units arises through the difference between the selling price of a unit and the changeable (variable) cost of producing and selling that unit. Teachers should use a series of short yet effective calculations which determine the additional profit on a number of additional units (such as that in Q1.2.3), or the converse calculation which determines the number of units that would lead to a certain increase in net profit.

(h)   Although the Production Cost Statement and Abridged Income Statement were not required in this question, in teaching these items teachers should not only reinforce the format, but should also require learners to reflect or comment on the unit costs associated with the statements. Teachers are advised to devote time to discussion on how increases or decreases practically occur in the fixed or variable costs associated with production and the effects thereof on the performance of the business.

(i)   Teachers must continue to 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. The scenarios in Q1.2.3, Q1.3.3 and Q1.3.4 could be used as examples in addition to the many examples on past examination papers.

QUESTION 2: RECONCILIATION

This topic is generally pitched as an easy to medium question, but the process of completing the reconciliation (Q2.2; 11 marks and Q2.4; 8 marks) remains a problem for many candidates. This is a concern, as the basic application relevant to this topic is covered in Grade 11 and this topic appeared in different ways in many past examination papers.

Most candidates were able to provide appropriate advantages of EFTs (Q2.1.1) and to recognise the internal control issues that may ensue if this duty is not effectively managed (Q2.1.2). It is evident that the concept of electronic banking has slowly filtered into the teaching process. While weaker candidates were able to offer relevant comments, they struggled to process specific accounting entries.

Common Errors and Misconceptions

(a)   Some candidates were not able to place the relevant figures in the correct cash journals and/or the bank reconciliation statement, and lost marks for superfluous entries. This clearly exposed their lack of understanding of the logic and reasoning of the reconciliation process. The marking guidelines made provision for the two-column and the one-column methods. The weaker candidates could not appreciate the difference, often repeating figures in the incorrect columns of the reconciliation statement and/or in the cash journals.

(b)   While many candidates were able to take advantage of the easier entries, which included the stale cheque, bank charges, rent income and interest, many had difficulty with the treatment of the bank error on the statement (R1 125), the incorrect amount for cheque 516 in the books of the business and lost cheque 427.

(c)   The calculation of the closing bank account balance was generally well done, although weaker candidates did not use the journal totals; instead entering individual figures of the transactions. There were also some cases where candidates did not use the given opening balance of R9 200. Candidates were at liberty to use any method for this calculation, including a Ledger Account format. There were some cases of candidates not being able to determine whether their final answer was a favourable or unfavourable balance when transferring this amount to the Reconciliation Statement.

(d)   It was disappointing to note the number of candidates who did not realise that the balance as per Bank Statement was a balancing figure in the Reconciliation Statement. To get this amount, for those using the two-column method, it was necessary to ensure that the debit column was equal to the credit column on the Reconciliation Statement.

Suggestions for Improvement

(a)   In addressing this topic, teachers must appreciate that reconciliations are important monthly internal control processes that involve structured procedures or steps. Basic application is extensively covered in Grade 11 and reinforced in Grade 12. It must not be assumed that this is an easy topic; weaker learners will require more revision material and regular practice.

(b)   It is necessary to consistently refer to the internal control benefits of the reconciliation process by emphasising the importance of the external documents (statements) received, especially when differences must be identified and appropriate action must be taken in addressing errors and omissions.

(c)   It is advised that teachers commence every topic by assessing prior knowledge. For the topic of Reconciliations, source documents supporting the entries in Cash Journals and their effect on the accounting equation form a necessary starting point. A comparison between these documents and the information on Bank Statements is likely to highlight possible errors and expose any mismanagement, incompetence or fraud.

(d)   Grade 12 teachers must ensure that in-depth revision of preparation in all forms of reconciliations (including debtors and creditors) are included in their teaching plans.

(e)   The *CAPS* stipulates that the focus in Grade 12 should be on analysis and interpretation of reconciliations. Learners are therefore expected to apply higher-order thinking skills in this regard; however, they must become proficient in the application processes first. Although this question did not focus on analytical problem-solving scenarios, teachers must use questions from past examination papers and various other sources to ensure that learners become familiar with the different ways in which this topic can be tested.

(f)   The informal assessment programme must include short, formative tests in class that can be self- or peer-marked. Learners will then take responsibility for their shortcomings and appreciate how marks can be earned (or lost) in examination situations.

(g)   Due to developments in the Fourth Industrial Revolution, teachers are encouraged to keep up with current trends in all matters affecting the Accounting content. All sectors in the economy are moving towards the digital age. Learners are exposed to the media and many are familiar with the internet. This trend is also transforming the banking sector. In this age of internet banking it should also be noted that provisional online Bank Statements can be printed on any day and at any time; however, banks would also publish formal statements at specific intervals, which should be used for the reconciliation process.

(h)   It may also be argued that, with advancements in technology, bank errors will eventually be a thing of the past, and EFTs being instant transactions cannot be recorded as outstanding. In addressing this argument, teachers should have class discussions on cybercrime, ethics, fraud and human error, e.g. the case where a student found millions of rands deposited in her account in error and she proceeded to use the money. It must be pointed out that reconciliations is a routine process using the same set of external documents, however, time differences can account for outstanding transactions.

(i)   Teachers need to explore various avenues to source relevant, up-to-date information. The textbook will provide standard procedures and examples but might not be adequate to address current or new issues or developments. Newspaper articles and financial publications should be used more extensively in class discussions to enhance the teaching of this topic.

(j)   Subject advisors must identify the underperforming schools, as informed by the analysis of results, and support teachers by providing relevant material, on an ongoing basis, rather than engaging on damage control prior to examinations.

QUESTION 3: INVENTORY VALUATION

This question assessed different stock valuation methods and problem-solving in the context of internal control. The focus was on three different products. A balance of basic calculations, interpretation and ethical considerations were included for each product. Although there were some challenging interpretative sub questions, the majority of candidates took advantage of the easily obtainable marks for routine calculations and comments, often appearing regularly in past examination papers.

Only two of these products required stock valuations, i.e. the FIFO method for cabinets (Q3.1) and the specific identification method for television sets (Q3.5). Calculations were also required for the % mark-up achieved (Q3.2.1), the stockholding period (Q3.3) and the number of missing items (Q3.4).

In addition to the basic calculations, this question integrated business ethics and mismanagement in a problem-solving context. This issue is receiving much public interest as it has plagued society in recent times.

Common Errors and Misconceptions

(a)   Candidates from many centres used unnecessarily lengthy processes by calculating cost of sales and then using this figure to arrive at the stock valuations (Q3.1; 6 marks and Q3.5; 7 marks). It is a concern that they have either been taught to value stock in this way or are inventing their own methods. Although using cost of sales should also lead to the correct answer, it is not advised as it is a much more complicated approach which results in loss of valuable time by candidates.

(b)   In calculating the value of the closing stock using FIFO (Q3.1; 6 marks), the weaker candidates did not consider the items that were returned from the latest purchases. They were, however, able to score the method marks.

(c)   Some candidates did not calculate the gross profit, which was necessary to calculate the % mark-up achieved (Q3.2.1; 4 marks). They simply divided the sales amount by the cost of sales and consequently earned part-marks.

(d)   The valuation of closing stock for televisions (Q3.5; 7 marks), using specific identification, was poorly answered. Many candidates confused the two models, the cost prices, the selling prices or the number of units bought and sold, but were able to score 3 of the 7 marks for quoting the unsold units.

(e)   In calculating the stockholding period (Q3.3; 3 marks), candidates were specifically required to use the closing stock figure. However, many candidates used the average stock figure, which would have required a further unnecessary calculation. It must be noted that this calculation can be done using monetary amounts or units, but some candidates confused monetary values with units.

(f)   The problem-solving questions (Q3.2.2; 4 marks and Q3.2.3; 6 marks) were generally poorly answered by weaker candidates; however, many were able to score part-marks for quoting the relevant figures for sales, gross profit and number of customers. The well-prepared candidates provided clear and concise responses and scored very good marks.

(g)   The many inappropriate responses in Q3.6 (6 marks) clearly showed that candidates could not grasp the concept that the 'commission' was an underhanded, unethical transaction, which could be regarded as bribery and corruption. Many candidates were not able to provide three different concerns, often restating the same point in different ways.

Suggestions for Improvement

(a)   In teaching and assessing stock valuation, teachers are advised to focus on the standard calculation using units of closing stock and the appropriate unit cost prices. Learners should understand that this applies to the FIFO, weighted-average and specific identification methods. As extension, the cost of sales method could be used in class to verify the stock value calculated in the normal way.

(b)   A recap and revision of stock systems (perpetual and periodic) covered in Grade 11 is necessary to address prior knowledge. Teachers should then proceed to introduce the three valuation methods and their relevance to different types of products. A variety of examples and questions must be provided.

(c)   Short summative tests, extracted from previous examination papers, are useful in illustrating the differences of each stock method.

(d)   Predictable calculations under all stock valuation methods involve figures for closing stock, cost of sales, gross profit and missing items. Teachers are also expected to cover the relevant financial indicators relating to stock and critically discuss their usefulness in effective management and internal control.

(e)   The topic of stock lends itself to deep problem-solving scenarios. Learners are expected to analyse the information presented, usually in tables, to justify and support the arguments they present. This will normally involve comparisons between different products or between time periods. This skill must be developed over time, using many examples from past examination papers.

(f)   In addition to short aspect testing, this topic can easily be integrated into case studies and assignments, further illustrating that stock valuation should not be taught in isolation.

(g)   In addressing the ethical considerations as highlighted in this question, teachers are advised to refer to the point in the General Comments above, and to ensure that such scenarios are incorporated into class discussions.

QUESTION 4: COMPANY FINANCIAL STATEMENTS AND AUDIT REPORT

The preparation of information for the financial statements integrated the following topics: Fixed Assets (Q4.2.1; 11 marks), correcting the net profit (Q4.2.2; 9 marks), preparing the Retained Income Note and completing the Balance Sheet (Q4.2.3; 36 marks).

These subquestions have been tested extensively over the years, and in spite of the abundant supply of resources, many candidates continue to show weaknesses in calculations and adjustments that recur in many past examination papers. Weaker candidates were able to score the 'easier' marks for the correct treatment of given figures, but struggled with some of the complex adjustments.

Many candidates did not attempt the subquestion on the Audit Report (Q4.3; 9 marks).

Common Errors and Misconceptions

(a)   In Q4.2.1 (11 marks), candidates struggled with the calculations for depreciation and the carrying value of the vehicle sold. They also failed to effectively transfer their incorrect calculations to subsequent subquestions, where method marks could be earned. This topic was an application of Grade 11 content.

(b)   In calculating the correct net profit in Q4.2.2 (9 marks), many candidates did not indicate the adjustments with the correct sign specifically required (+ or -). Some candidates did not reflect this in their workings either.

(c)   Well-prepared candidates were able to calculate the correct income tax amount by adding the amount due to SARS (R43 000) to the provisional tax payments (Q4.2.2; 2 marks). Many candidates, however, simply used the R43 000 as the income tax adjustment.

(d)   The only challenging adjustment to profit was for Rent Income (Q4.2.2; 2 marks), which was phrased in the same way as in many previous papers. This calculation was poorly handled by most candidates.

(e)   The preparation of the Retained Income Note (Q4.2.3; 9 marks) was generally well done. The only shortcomings identified were the calculation of the amount in excess of the average share price applicable to repurchased shares and the correct number of shares that were entitled to receive final dividends. Weaker candidates continued to ignore the application of the correct adding or subtracting operations and lost the mark for the final balance.

(f)   It was also evident that much time and effort was spent in the revision of the Balance Sheet (Q4.2.4; 27 marks). The average and above average candidates have sharpened their analytical and presentation skills and were able to score very good marks. It was noted that fewer candidates were penalised this year for incorrect classification of items in the Balance Sheet.

(g)   Weaker candidates could not do the transfer from debtors to creditors correctly and did not show all workings for Trade and Other Receivables (Q4.2.4; 5 marks) and Trade and Other Payables (Q4.2.4; 5 marks). They also showed their ignorance regarding the basic format by misplacing many relevant items, losing valuable marks in the process.

(h)   Many candidates were able to calculate the value of the current assets using the current ratio and the current liability figure, which was given (Q4.2.4; 2 marks).

(i)   Weaker candidates experienced difficulty in calculating the short-term portion of the loan. This was the balancing figure under Current Liabilities, which was also needed to adjust the Non-current Liabilities (Q4.2.4; 2 marks).

(j)   The poor performance in the Audit Report (Q4.3; 9 marks) can again be attributed to the scant regard given to this topic, probably because teachers assume that the content is very limited and self-explanatory. Although most of the candidates who attempted this question could identify the type of audit report received and the acid-test ratio, it was surprising that many could not provide examples of audit evidence, as this question has been asked in previous papers. Many candidates could also not provide suggestions for actions that directors could have taken to prevent the type of audit report.

Suggestions for Improvement

(a)   It must be accepted that preparing financial statements will always form a major part of an Accounting paper. The Income Statement and/or Balance Sheet have appeared in all previous examination papers, tested in different ways. Teachers and learners have an ample supply of resources to prepare for this topic, including past year-end and supplementary papers.

(b)   It is noted that weaker candidates tend to perform better in preparing an Income Statement than a Balance Sheet. Due to the structure of the Balance Sheet with more components or subsections, revision of the underlying concepts and format will require more attention.

(c)   The basic format and preparation of financial statements are introduced in Grade 10 and reinforced in Grades 11 and 12. The Grade 12 learner is expected to have a solid foundation, which must include concepts, formats, elements of the accounting equation, the double entry principle and the steps in the accounting cycle. As a starting point, teachers must assess prior knowledge through revision tests before proceeding with the Grade 12 content.

(d) Although each financial statement is dealt with separately in the Annual Teaching Plan, teachers need to refer to the context of the Annual Report, presented at the general meeting of shareholders, constantly, so that learners can appreciate the usefulness and relevance of financial statements and the difference between financial performance and financial position.

(e) As a trend, financial statements are always accompanied by specific notes. Regular formative tests can be used effectively to ensure that learners are able to identify the composition/components of the different notes and their place on financial statements.

(f) A collaborative learning approach can be implemented on a piecemeal basis, with a focus on related notes, progressing from the easy to the more challenging or complex calculations. Example: Adjustments can be addressed together with Current Assets and Current Liabilities, Shares Issued, Shares Repurchased and dividends can be addressed with the Ordinary Share Capital and the Retained Income Notes.

(g) An advanced stage of preparing financial statements will require insight and analytical skills, as well as an ability to work from any point, using financial indicators and balancing figures to complete the statements. This is often the style adopted in Grade 12 examination papers.

(h) Balancing figures can sometimes be seen as a stumbling block, but in most cases, they can motivate learners to proceed with the exercise, using their own calculations rather than becoming frustrated. In this question the method marks on incorrect figures amounted to 15 of the 27 marks on the Balance Sheet, and 9 of the 18 marks on the Net Profit calculation and Retained Income Note.

(i) Because of the integrated use of financial indicators, teachers are encouraged to also integrate the topic on interpretation of financial statements instead of addressing this as an isolated topic. To this end, teachers must also recognise their content gaps and take appropriate steps to bridge the gaps. A useful exercise would be for teachers to regularly spend a few minutes in class after the completion of a Financial Statement by asking learners to reflect on the Financial Statement they have prepared and share one or two significant items that they might have noticed. In so doing, the purpose of the financial statements will be reinforced, thereby laying the basis for further study on financial indicators.

(j) With reference to the Audit Report, it is important to expose learners to different examples of Audit Reports, i.e. unqualified, qualified and disclaimers. These can be obtained from past NSC examination papers, textbooks, published financial statements in the financial press or the internet. Class discussions can be used effectively to cover this topic. Learners must be encouraged to participate freely and to express their ideas and comments in the language of learning and teaching. Teachers often resort to code-switching and teaching in their vernacular. This tends to complicate the language barriers experienced by learners.

(k) Learners must engage meaningfully with each paragraph of a standard Audit Report in order to understand the need for each paragraph. They should appreciate the considerable training and skill required of auditors, as well as the responsibilities that they are expected to discharge.

(l) Subject advisors must address the issue of language seriously across the curriculum and provide opportunities for teacher development on this matter on an ongoing basis.

QUESTION 5: 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 (CFS), analysis of and commentary on share prices, dividends, returns and interpretation of cash flow information.

Candidates generally perform well in certain aspects of the question that predictably feature in all previous examination papers. Most candidates were able to correctly calculate or at least earn part-marks on the figures required for a company's CFS (Q5.2.1; 19 marks) and the calculation of financial indicators (Q5.2.2; 12 marks).

As usual, the question also covered a variety of interpretative subquestions that required explanations with supporting figures. These were generally well answered by the more capable candidates, but weaker candidates continued to be challenged with this section of the topic.

The subquestions on interpretation have traditionally been asked in one of two contexts, either:

- One company (with comparisons over two financial years); or

- Two companies (with comparisons over the same financial year).

In this question paper, Q5.3 reflected the two-company option. The information was consistent with that of previous papers, but was presented in a more summarised format of tables for financial indicators, a comparative CFS and the shareholding of a specific shareholder. It was expected that the concise nature of the information would be user-friendly for candidates; however, candidate responses in this regard were generally disappointing. The more capable students were, however, able to show insight and understanding and earned good marks.

Common Errors and Misconceptions

(a)   The calculations required for the CFS (Q5.2.1; 19 marks) were consistent with those asked in many previous papers. While weaker candidates were able to earn part-marks on most of these calculations, it is disappointing that, in view of the regularity and predictability of these sub questions, they did not perform better. In particular, the calculation of income tax paid and fixed assets purchased did not involve any nuances that would have been challenging.

(b)   Calculations of the financial indicators in Q5.2.2 (12 marks) were generally well answered and many part-marks were awarded. It was disappointing that some candidates did not answer this sub question at all. This tends to indicate that the financial indicators are not adequately taught and revised in Grades 10–12 in certain centres. None of the calculations involved the added complication of calculating averages over two years. Furthermore, the titles of two of the indicators (i.e. % operating profit on sales and debt-equity ratio) actually dictate the figures that are required for the calculations.

(c)   The earlier reference in Q1 to skills involving percentages and ratios learnt in Mathematical Literacy are also applicable to the financial indicators in Q5. Many candidates lost marks because they did not understand the format of a calculation as demanded by the requirements of the question, i.e. whether the answer should be reflected as a percentage, cents/rands or a ratio.

(d) Weaker candidates showed little understanding of why directors should be interested in the JSE price of their company's shares (Q5.3.1; 2 marks). They were also unable to calculate the additional shares that a shareholder could buy (Q5.3.1; 3 marks). This was particularly inexplicable because both the invested amount and the price of each share was explicitly provided in the same point of information. Many weaker candidates multiplied the funds by the price instead of dividing it, which indicates the severe limitations of these candidates.

(e) It was disappointing that more candidates could not answer the relatively easy evaluative question of the dividend pay-out rate (Q5.3.2; 6 marks), as this question has consistently been asked over the past three years. Candidates could either perform a calculation of dividends per share as a % or earnings per share, or they could do a comparison of dividends to earnings.

(f) The analytical question on why the shareholder should regard the lower indicator of earnings share (EPS) in one company as better than the higher indicator of the other company (Q5.3.2; 5 marks) is regarded as one of the higher-order and difficult questions. An appropriate response would require a comparison of the EPS to the value of the share. Weaker candidates found this question beyond their ability. Capable candidates were able to earn part-marks on this sub question through partially correct answers, and some revealed considerable insight, thereby earning full marks.

(g) Identifying directors' decisions from the CFS was asked in the 2018 Accounting NSC question paper. It was disappointing that many candidates did not quote two of these decisions from the four possible alternatives provided for each company in Q5.3.3 (8 marks). Instead, some quoted financial indicators despite the question stipulating that they should refer to the Cash Flow Statements.

(h) Weaker candidates struggled to express valid comments or explanations on the financial indicators required for each of the sub questions in Q5.3. These questions always require the quoting of figures, indicators or calculations to support the answers. Although this question was generally well done by above-average candidates, many candidates neglected to provide the necessary proof or evidence, thereby losing marks unnecessarily.

Suggestions for Improvement

(a) Teachers are referred to earlier versions of the diagnostic report for advice on principles of introducing and teaching the CFS, e.g. relating inflows and outflows of cash to items that would appear in the CRJ and CPJ, introducing the sections of the CFS separately and conducting regular class discussions on the figures to 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 outflows of cash.

(b) 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.

(c)   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 should know that total dividends paid is equal to the opening balance for shareholders for dividends plus the interim dividends paid.

(d)   Teachers must continue to devote extra attention to the basic calculations through regular formative assessment, particularly in the case of weaker candidates. This revision should include calculations such as percentages and ratios, as well as other relevant formats, e.g. days for stockholding periods, units for items of stock or cents/rands for unit costs or share values.

(e)   It is expected that problems in explaining basic concepts, such as those involving the investment of shares (Q5.3.1), would be identified and remedied by covering these concepts as part of the underlying theory of companies or in the evaluation of textbook information on companies, and then reinforcing these through regular formative assessment and class discussions.

(f)   Extending capable students is another vital responsibility expected of Accounting teachers. Concepts such as those in Q5.3.2 could be used for this purpose. The question on the advanced evaluation of EPS of the two companies (Q5.3.2; 5 marks) revealed an insightful comment from a candidate that 'as the price of the shares in Horizon Ltd is more than double the price of the shares in Optima Ltd, the shareholder would have expected the EPS of Horizon Ltd to also be at least double that of Optima Ltd'. The answer could also have been supported by calculations of EPS as a % of share price (i.e. 97 as a % of 840 = 11,9% and 83 as a % of 400 = 20,8%), but as this is not an indicator stipulated in the *CAPS*, it was not required. A discussion on this topic would also serve to expose capable learners to the Earnings Yield or the Dividends Yield % that would be studied at university.

(g)   Examination questions involving interpretation of financial information will usually require supporting evidence. Teachers must instruct learners to quote the relevant figures, calculations or indicators, as these will be allocated marks, they will enhance their explanations and they may also emphasise or imply the trend. Discussions on such questions should be included in the teaching process. This will also bring more learners into the learning process, offering different interpretations and suggestions to the same problems.

(h)   Learners need to understand the logic underlying each financial indicator. For example, net asset value reflects the basic value of each share according to the books of the company and therefore, the shareholders' equity and the number of shares 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.

(i)   The printed answer book is intended to assist candidates in structuring responses. However, learners must be instructed to refer to the question paper for each question, and not to rely on the answer book to repeat all aspects of questions. Regarding the inappropriate responses to Q5.3.3 (8 marks), it is possible that these candidates who did not refer to the information in the CFS did not read the stipulation to do so in the question paper.

QUESTION 6: BUDGETING

Many candidates appeared to struggle to complete this question, and some did not attempt the question at all, possibly due to an inability to comply with the suggested time frames on previous questions. In some cases, however, candidates reflected similar performance as that of other questions.

The first part of this question (Q6.1; 11 marks) required candidates to identify figures that would appear in a Cash Budget and/or a Projected Income Statement. This reflected a change to the style of questioning as this topic has usually required candidates to provide or calculate missing figures in either of these statements, a procedure which, in fact, falls into the Grade 11 Accounting *CAPS*.

The intention of combining both statements in the same question is to assess candidates' knowledge of the differences between the Cash Budget and the Projected Income Statement. It was expected that this question would be easy to moderate, as it focused on only three items with key figures provided and no complicated calculations were involved.

The other parts of this question have all been covered in past NSC papers:

- Q6.2 (7 marks) covered analysis of a Debtor's Collection Schedule.

- Q6.3 (18 marks) covered evaluation of projected and actual figures in a Projected Income Statement and problem-solving scenarios. Candidates had to interact with the actual and budgeted figures and quote relevant figures to support their explanations.

- Q6.4 (4 marks) covered a basic budgeting calculation.

Common Errors and Misconceptions

(a)   Although capable students were able to score good marks on this question, it was disappointing that Q6.1 was generally not well done. The explicit template and the simple transactions explained in the question should have ensured that placement of figures in the appropriate statement and correct months was obvious. However, many candidates placed these sporadically in the template and some presented several superfluous entries, which indicated that they generally did not understand the purposes of a Cash Budget and a Projected Income Statement and the differences between them. There was a penalty for superfluous entries (Max -2).

(b)   In Q6.2 (7 marks) most candidates who attempted the question could earn full or part-marks on the % of debtors settling their accounts in the second month. However, the calculation of the % bad debts was poorly done by weaker candidates and their methods used were often not logical.

(c)   Q6.3.1 (6 marks) was generally well done. The assessment of salary or wage increases is a topic that candidates can relate to easily, and the question has been asked in several past NSC papers. The only problems in this regard were experienced by candidates who did not quote appropriate figures as required, and those who could not identify a second valid point without merely repeating the essence of their first point. Some candidates did not calculate the % increase in wages, which would have enhanced their answers. It is a concern that many weaker candidates could not perform a basic Grade 9 calculation, i.e. the percentage increase in salaries.

(d)   Most candidates earned part-marks in Q6.3.3 (4 marks) because they focused only on one month. Many candidates failed to see how certain items are related, such as carpet sales and installation expenses. The information reflected that there was poor control of installation costs in September as evidenced by the over-budget expenditure despite the decrease in sales. The higher-order aspect of this question was reflected in October where, although the expenditure was over-budget, this was justified because of the increased sales. Only the more capable candidates were able to identify and explain this.

(e)   The question on the effect of the new competitor and the decisions to counter this threat (Q6.3.3; 8 marks) is a repetition of questions in previous papers. Candidates who were able to complete this question achieve good marks on the comment and were able to easily identify two decisions taken by the owner.

(f)   The calculation of the amount payable to creditors (Q6.3.4; 4 marks) was satisfactorily done, although weaker candidates were not able to use percentages correctly, particularly the 5% cash discount. Some candidates applied the correct percentages to the projected cost of sales and scored the relevant part-marks.

Suggestions for Improvement

(a)   It is vital that learners understand the distinct purposes of a Cash Budget and a Projected Income Statement, as well as their similarities and differences. Teachers are advised to devise tasks, such as Q6.1 for formative or summative assessment, as this can be used to good effect in diagnosing learners' understanding or misconceptions of these two managerial accounting documents. It is not a time-consuming exercise and it is user-friendly for self- or peer-marking. Such an exercise also places emphasis on cash and non-cash items and the distinction between Balance Sheet accounts and nominal accounts; concepts that are also relevant to other parts of the syllabus.

(b)   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. While 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 in improving learners' confidence in interpreting budgeted and projected information.

(c)   The points mentioned earlier in this diagnostic report in Q1 and Q5 relating to constant revision and reinforcement of learners' skills in using percentages is equally applicable under this topic. Constant short tests that may be repetitive are useful in this regard.

(d) It is recommended that scenarios such as those in Q6.3 be used for discussions in class so that learners are exposed to the logic and variety of possible responses. Case studies and assignments can also be effective in this regard.

(e) In teaching the analysis of actual figures against budgeted figures, teachers must focus on the appropriate use of terms such as *overspent, underspent, under-budgeted* and *over-budgeted*. Such initiatives will also be indirectly addressing the language barriers that learners experience in clearly expressing their ideas.

(f) Teachers are advised to impress upon learners that in the assessment of variances, they should not simply 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 2019 NSC examinations.

3.1 PERFORMANCE TRENDS (2015 – 2019)

The number of candidates who wrote the Agricultural Sciences examination in 2019 decreased by 2 611 in comparison to the number in 2018. The performance of the candidates in 2019 compared to performance in 2018 reflects noticeable improvements at the 30% level from 69,9% in 2018 to 74,6% and at the 40% level from 41,8% to 45,7%. The 2019 cohort of candidates recorded the highest achievement at the 40% level since 2015.

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
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
2019	92 680	69132	74,6	42385	45,7

From 2015 to 2018 there has been a gradual decline in the overall results. However, a slight improvement has been noticed in 2019. Improvement was noted in certain main content areas in Paper 1 such terminology, animal production, protection and control and animal reproduction. In Paper 2, there was a remarkable improvement in basic agricultural genetics. This content area has always been a serious challenge over the years. A gradual improvement in the drawing of graphs was noted.

It has also been observed that content gap workshops assist in capacitating teachers. This is reflected in the manner that candidates responded to questions.

Graph 3.1.1 Overall Achievement in Agricultural Sciences (Percentage)

	2015	2016	2017	2018	2019
% achieved at 30% and above	76.9	75.4	70.4	69.9	74.6
% achieved at 40% and above	45.0	44.5	39.9	41.8	45.7
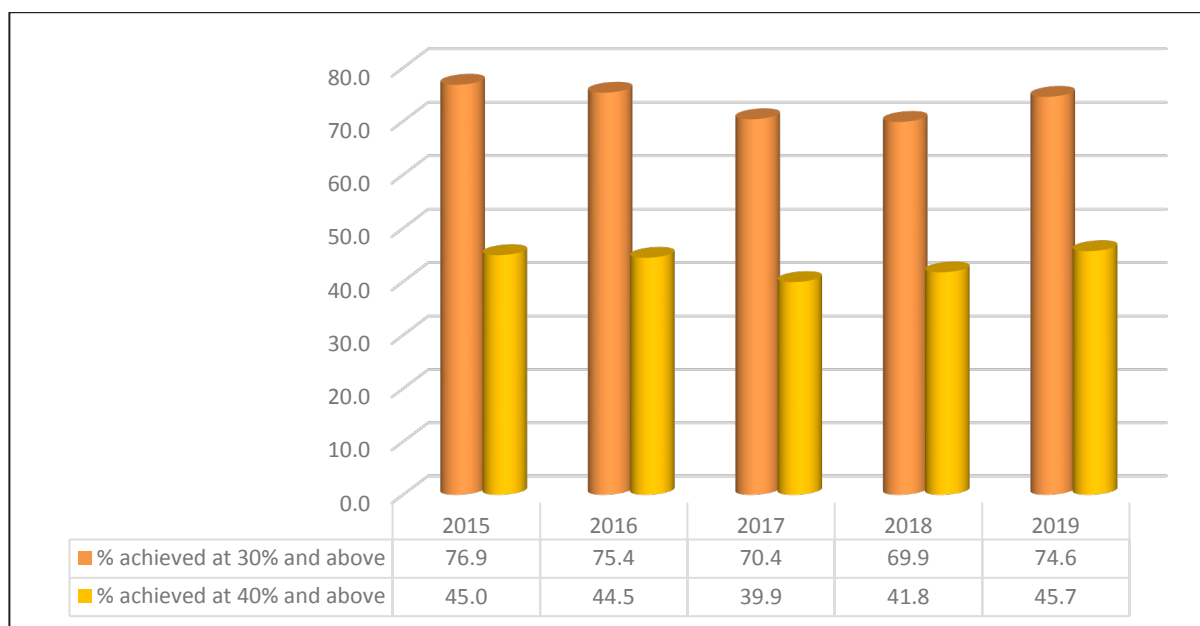
Graph 3.1.2 Performance Distribution Curves in Agricultural Sciences (Percentage)

	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
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
2019	0.2	5.5	19.7	28.9	23.3	13.6	6.1	2.2	0.5	0
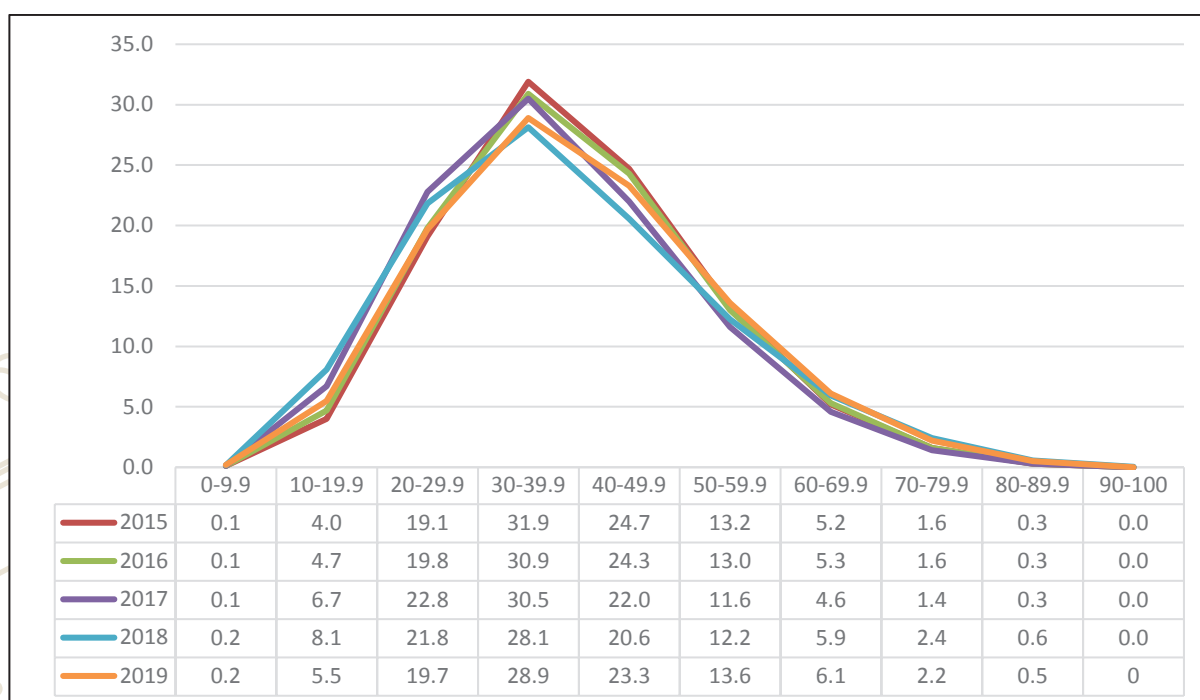
3.2   GENERAL COMMENTS FOR PAPER 1 AND PAPER 2

This report contains comments on specific questions that proved difficult for candidates, as well as suggestions to rectify these. 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 are applicable to both papers in 2019:

(a) **The importance of formative testing:** Short, informal formative tests must be used to build the confidence of learners in all topics. Self-assessment or peer assessment provides learners with immediate feedback on errors and provides an understanding of the mark allocation. It also exposes learners to valid alternative responses.

(b) **Basic concepts & terminology:** Learners should make every effort to have a deep understanding of 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 the definitions. Terminology should form an integral part of teaching and learning and needs to be emphasised on a regular basis. Teachers are advised to make the teaching of terminology interesting by identifying key concepts for each topic and then guiding the learning of such concepts.

Learners should also be encouraged to prepare a glossary or concept bank of subject terminology based per topic. 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.

- Encourage learners to be attentive during lessons, to identify new terms and to find the meanings in a dictionary or textbook.

- 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.

- Agricultural Sciences terminology should be assessed daily in informal tasks.

- Challenging or confusing terminology could be explained by using illustrations on posters. These posters can be pinned on notice boards in the classroom so that learners could be exposed to them 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 the instructional verbs as emphasised in the *Examination Guidelines*. It is very unfortunate that weaker candidates under-achieve in the NSC examinations because they do not respond correctly to specific questions and sub-questions. Teachers are strongly advised to expose learners to the key verbs such as 'comment', 'justify' and 'suggest'. Teachers are advised to use questions from past NSC papers that assess the same topic but involve different action verbs. This will afford leaners the opportunity to see how the responses to these questions differ. Teachers should use various instructional verbs in both informal and formal assessment tasks. 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 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 can be used to illustrate aspects of the various topics more meaningfully.

Teachers are advised to include scenarios and short statements in informal and formal assessment tasks. Teachers should first read and analyse scenarios with the learners before reading and analysing the questions which follow. In some instances, learners may be requested to formulate their own questions on the scenario. This will allow learners to critically analyse the scenario. Teachers can then develop follow-up questions to extend learners' understanding of the scenario.

(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. Regular, informal tasks on calculations incorporating these concepts are essential. Learners seem to lack appreciation of the magnitude of the various units, such as the difference between tons and kilograms. It is very disappointing that some Grade 12 candidates cannot confidently handle 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 to 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 aspects that have not been covered in recent question papers. However, it is important that teachers cover these aspects so that learners have a holistic understanding of a topic. 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)   Candidates' performance in Q1 and Q4 showed an improvement from 2018.

(b)   There was a decline in performance in Q2. This may be attributed to poor performance in Q2.1.4, Q2.2 and Q2.3. In these questions, candidates showed a lack of knowledge on how NPN is beneficial to ruminants. They were also unable to differentiate between a *protein rich* and a *protein poor* feed.

(c)   It is evident from the marking process that Q3, on animal handling and protection, is still a challenge.

(d)   Reponses to Q4, on animal reproduction, have improved but many candidates did not perform well in Q4.6. This question assessed the importance of the various aspects of embryo transfer. Candidates failed to interpret the roles of hormones that play a role during mating. Instead, they gave responses that cited the general functions of oestrogen and testosterone.

(e)   Questions requiring reasoning, motivation or justification were still poorly answered by most candidates. This indicated that candidates are not really exposed to these types of questions in the classroom.

(f)   Language of learning and teaching is proving to be a challenge to most of candidates.

General Suggestions for Improvement

(a)   Teachers should always use the *CAPS* coupled with the *2017 Examination Guidelines* when teaching and assessing formally and informally.

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

(c)   Teachers should assess learners on data response questions and should pay more attention to application questions in order to improve the learner's ability to interpret such questions.

(d)   Teachers need to apply the concept of *English Across the Curriculum* by integrating the various language skills in their teaching and assessment. This should assist learners in responding to questions as expected.

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.

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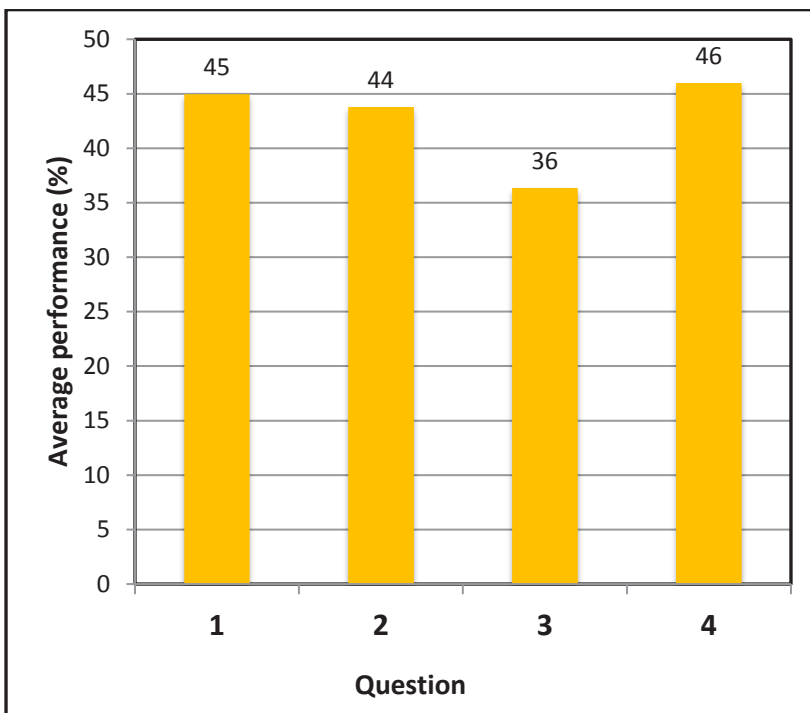
Q	Topic
Q1	Short questions
Q2	Animal nutrition
Q3	Animal production, protection & control
Q4	Animal reproduction

Graph 3.4.2: Average Marks per Subquestion Expressed as a Percentage for Paper 1

Subquestion	Label	Average performance (%)
1.1	Multiple choice	52
1.2	Match type	50
1.3	Terminology	34
1.4	Replacement	38
2.1	Alimentary canals of farm animals	42
2.2	Composition of a ration	27
2.3	Pearson square	27
2.4	Nutritive ratio	52
2.5	Energy value of feed	44
2.6	Bar graph on quantities of minerals	76
3.1	Critical temperature and heat production	44
3.2	Poultry production system	48
3.3	Baic guidelines in handling large animals	37
3.4	Parasites	35
3.5	Animal diseases	34
3.6	Salt poisining	19
4.1	Reproductive cycle in farm animals	39
4.2	Sperm morphology	36
4.3	Technique for artificial insemination	65
4.4	Foetal membranes	35
4.5	Parturation	78
4.6	Embryo transfer	30
4.7	Nuclear transfer	38
	FINAL TOTAL	43

3.5 ANALYSIS OF LEARNER PERFORMANCE IN INDIVIDUAL QUESTIONS IN PAPER 1

QUESTION 1: SHORT QUESTIONS (ANIMAL SCIENCES)

An improvement in performance was recorded for Q1.2. Many candidates seemed better prepared for this question than in previous years and they also paid more careful attention to the instruction of A only, B only, Both A and B or None. However, some candidates were still guessing answers in Q1.1 and resorted to responding in a particular pattern. This resulted in them losing of a number of marks.

Q1.3 and Q1.4, which assessed subject terminology, still posed a problem and performance in these two questions showed a decline. It is evident that candidates were still struggling with terminology even though this has been raised in all the past reports. The lack of understanding of terminology impacted negatively in certain questions, such as Q1.3.1, Q1.3.2, Q1.4.2 and Q1.4.4.

Common Errors and Misconceptions

(a)   Many candidates were still challenged by multiple-choice questions that have a combination of distractors. Poor performance was noted in Q1.1.4 and Q1.1.6.

(b)   In Q1.3.1 some candidates failed to provide the correct term for a given description. Instead they were giving generic responses like 'feed plan'.

(c)   Q1.3.2 posed a challenge to a great number of candidates. They were unable to relate lighting in the night to feed consumption. Some candidates gave responses such as 'lightning'.

(d)   In Q1.4.1 some candidates mistook 'cafeteria style' for 'ad lib'.

(e)   Most of the candidates gave *dystocia* as the answer for Q1.3.4. It seemed that many candidates understood dystocia as the only pregnancy problem.

(f)   In Q1.4.4 most candidates gave 'miscarriage' as an alternative response to abortion. The term 'miscarriage' is more appropriate to humans than animals.

Suggestions for Improvement

(a)   Subject advisors and teachers should compile a document that explains all the terms and concepts for various topics in the curriculum.

(b)   Before starting to teach a new topic, teachers should use this document or any other source to provide learners with a list of the terms that are relevant to the topic. This list will form a 'road map' that will help learners gauge how much content they know and understand in the topic.

(c)   Development of interesting games, like word puzzles, identification cards and Power Point presentations for the teaching of key concepts and improving the spelling of these concepts, should be considered. Spelling tests should be considered especially for concepts that are not easy to pronounce or write out.

(d)   The use of electronic technology, such as smart boards and the internet, should be encouraged to improve the learners' enthusiasm for the subject. It is hoped that this will stimulate learners to read other material pertaining to the subject.

(e)   Teachers should train learners on how to answer questions by guiding them on what the question is looking for.

(f)   Teachers should form a cohesive unit in their clusters. They can support each other by addressing challenging topics and with suggesting different approaches to teaching a topic so that it makes learning easy and enjoyable.

(g)   Provincial coordinators, together with teachers, need to prepare revision packs that cover all the topics. Teachers should use material from these packs as informal tasks, in class revision sessions and as mock examinations.

QUESTION 2: ANIMAL NUTRITION

Common Errors and Misconceptions

(a)   In Q2.1.1 some candidates could not classify the animals in the diagrams. Instead, they gave the names of the animals such as cow and fowls. This was not required.

(b)   In responding to Q2.1.4, many candidates were unable to explain how ruminants benefit from NPN.

(c)   The majority of candidates could not identify which feed was a carbohydrate-rich roughage or which was a protein-rich concentrate when answering Q2.2.1. They were unable to make a distinction between hays as roughages and grains/seeds as concentrates.

(d)   In Q2.2.2 most candidates were unable to explain why young lambs cannot be fed a ration made up of a high percentage of hay.

(e)   In Q2.3.2 most candidates calculated the kilograms of maize meal using the values of the sunflower oilcake meal. They misinterpreted the values given in the diagram.

(f)   The misinterpretation in Q2.3.2 affected many candidates' calculation in Q2.3.3, where they were required to calculate the amount of maize meal in the 250 kg mixture.

(g)   Candidates lacked an understanding of the basics of feed mixing in Q2.3. They did not know that the feed with a bigger value in the square is always the one poor in proteins and will constitute the greatest portion of that ration, in order to supply the required protein.

(h)   Many candidates could not express a value as a percentage in Q2.3.2 and could not convert the percentage or the parts of maize to kg in Q 2.3.3.

(i)   In Q2.4.2 many responses indicated that candidates were unable to apply knowledge. They could not associate a feed with NR of 1 : 4 as narrow, meaning that it is rich in proteins and therefore suitable for growth. Candidates were also unable to conclude that the feed with NR of 1 : 10 is wide and therefore not suitable for growth because it is poor in proteins.

(j)   In Q 2.6 some candidates lost marks because their graphs showed minerals of the same kind grouped together on the horizontal axis. The question required them to draw a graph showing the mineral composition of each ration.

Suggestions for Improvement

(a)   For the classification of each animal, learners should be shown diagrams of their alimentary canals alongside it. Various textbooks and other resources could be used in this regard. This overview will assist learners in making conclusions about similarities and differences of the alimentary canals.

(b)   Pictures and posters that display the internal structures and contents of the complex stomach could assist learners in understanding the parts and their roles in the digestion of ruminants.

(c)   Carefully planned practical investigations and questionnaires will assist learners in developing an in-depth understanding of the content.

(d)   Calculations in animal nutrition and the implications thereof should be explained to learners. This will enable learners to have a better understanding of the application of the results.

(e)   Giving more exercises with different source-based questions is imperative to make learners aware of how to respond to such questions.

(f)   Teachers need to train learners on the drawing of graphs and provide guidance on how they are marked.

QUESTION 3: ANIMAL PRODUCTION, PROTECTION AND CONTROL

Common Errors and Misconceptions

In general, the performance in this question was poor, with questions on animal health being answered the worst.

(a)   In Q3.1.1 most candidates responded with any answer. It showed clearly that they did not understand the relationship between lowest critical temperatures and heat production of the various animals.

(b)   In answering Q3.1.2, most candidates were unable to explain why day-old chicks and piglets should be kept under intensive conditions.

(c)   In Q3.1.3 candidates were unable to interpret 'lowest critical temperature'. Consequently, they were unable to provide a reason in Q3.1.4.

(d)   Many candidates were unable to apply their knowledge on the impact of high or low temperatures on the feed intake of piglets in Q3.1.5.

(e)   In Q3.2.1 some candidates' response was 'extensive system'. This is not applicable to poultry as these animals do not live entirely on the outside. They can be allowed to move out during the day and return at night. This implies that the owner still has the responsibility to feed them.

(f)   In Q3.2.5 most candidates referred to the equipment in the pig-house as a water reservoir which dispenses water.

(g)   The classification of the tick in Q3.4.1 was a challenge to most candidates. They named the tick as blue tick, brown tick or bont tick.

(h)   In Q3.4.3 some candidates did not read the question and rendered responses such as *tapeworm* and *liver fluke* instead of giving letters 'B' and 'C'. They also struggled to relate the symptoms to the respective parasites. This is a recurring problem.

(i)   Most candidates struggled to give the correct response in Q3.4.4. They lacked knowledge on the sustainable use of medication. Many candidates could not identify the animal diseases in Q3.5.1, the bacterial disease in Q3.5.2 and the pathogen in Q3.5.3.

(j)   In Q3.5.4 many candidates were unable to make a clear distinction between a *control measure* and a *prevention measure*.

(k)   In Q3.6.1 some candidates responded by giving the general symptoms of an unhealthy animal such *as loss of appetite* which does not directly relate to salt poisoning. In 3.6.2 a common response by candidates was 'giving animals too much water'. This response was not correct because the water given to a poisoned animal should be clean and should be given in frequent, small dosages.

Suggestions for Improvement

(a)   Teachers should emphasise the different structures and housing utilised for different farming enterprises. This can be achieved by exposing learners to real farming situations.

(b)   Learners should be encouraged to have access to the tools, equipment and facilities used in different farming enterprises.

(c)   Slides and videos on the facilities could be prepared and used in the classroom to arouse the interest of the learners.

(d)   Teachers should emphasise the teaching of diseases and parasites on production enterprises by making use of mind maps that group diseases/parasites based on the pathogens/vectors, key symptoms, preventative and control measures.

(e)   Teachers should ensure that the learners know the general and specific roles of the state that are applicable to proclaimed diseases.

(f)   The appropriate measures by farmers in the control and prevention of particular diseases and parasites should be clearly outlined.

(g)   Intensified revision of 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 Q4.1.1 most candidates could not correctly identify the reproductive process and the hormones that were involved in initiating the action.

(b)   Many candidates lacked the analytical skill needed to identify the hormones applicable to the actions of animals A and B in Q4.1.2. Instead, they gave the general functions of oestrogen (preparation of the uterus walls for implantation) and testosterone (secondary male characteristics).

(c)   In Q4.1.2 some candidates mistook animal B for another cow in oestrus because they looked at the stage in isolation to the others. The illustration might have given a clue of the action as mating and not just mounting.

(d)   Most candidates failed to analyse the statement and link it to the picture in order to define the reproductive process required in Q4.1.3(b). They gave gestation or pregnancy as a response instead of parturition.

(e)   Prolactin was the popular incorrect response to Q4.1.4 instead of oxytocin. Furthermore, candidates failed to indicate how oxytocin functions in the milk let-down as they were giving responses like 'stimulates the milk let-down' without referring to the contraction of the cells around the alveoli in Q4.1.5.

(f)   In Q4.2.1 some candidates referred to the process as *gametogenesis* which is a more general process of gamete formation that can also refer to the formation of ova. Some even provided 'a spermatozoon' as a response. This was incorrect as a spermatozoon is a cell and not a process.

(g)   Most candidates were unable to give the correct answer (microscope) for Q4.2.3.

(h)   In Q4.2.4 some candidates responded by referring only to the morphological defects such as no/small head, no/short tail without indicating how those defects will affect the sperm's ability to fertilise the ova. Some thought that the abnormality of the sperm cell may cause an abnormality in the embryo.

(i)   Most candidates struggled to score full marks in Q4.3 as they mixed up the steps. Most confused the removal of excess faecal matter from the house with the removal of excess faecal matter from the rectum of the cow. This clearly showed a lack of understanding of the AI technique.

(j)   In Q4.3.2 some candidates mistook AI with species crossing as they referred to the offspring that may be sterile.

(k)   Most candidates confused the responses for Q4.4.2(a) and (b) and opted for D as the membrane that attaches the foetus to the uterus.

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(l)   In Q4.5.1 the language proved to be a problem for some candidates who referred to the bellowing noise as the 'cow will cry loudly'.

(m)   Some candidates gave responses like dystocia, injuries and stress in Q4.5.2. This implied that they were aware of the problems that are likely to occur in heifers more than with older cows.

(n)   In Q4.6 most candidates were unable to relate the importance of the various stages to the process of embryo transfer (ET). Instead they opted to define the stages.

(o)   In Q4.7.1 most candidates spoke of the importance to the veterinarians rather than to the service and indicated *profit making* for the vets.

Suggestions for Improvement

(a)   Teachers are encouraged to make arrangements with institutions where various processes are practised so that learners can observe them to enhance the understanding of these reproductive processes.

(b)   In presenting the various processes such as oestrus cycle, synchronization of oestrus, artificial insemination, stages of pregnancy, embryo transfer, parturition and other reproductive processes, teachers should use flow diagrams, schematic representations, projections and videos to identify the characteristics and the effects of various hormones in the different processes.

3.6   OVERVIEW OF LEARNER PERFORMANCE IN PAPER 2

General Comments

(a)   Generally, the performance of candidates indicated an improvement in respect of subject terminology. The graph on average per question reflects an improvement in Q1 in 2019 when compared to 2018. This question mainly focussed on terminology. Most candidates struggled with Q1.4, which is a question on replacement. The answering technique of many candidates in the true and false questions showed improvement.

(b)   Q4 on Genetics was poorly answered in 2018 but showed remarkable improvement in 2019. This was due to satisfactory performance in breeding systems in Q4.2, genetically modified organisms in Q4.3 and patterns of inheritance in Q4.5.

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

General Suggestions for Improvement

(a)   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 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 extra informal research.

(c)   A mind map should be used when introducing each topic.

(d)   Strategies to enhance learners' skills in understanding terminology and mathematical 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.

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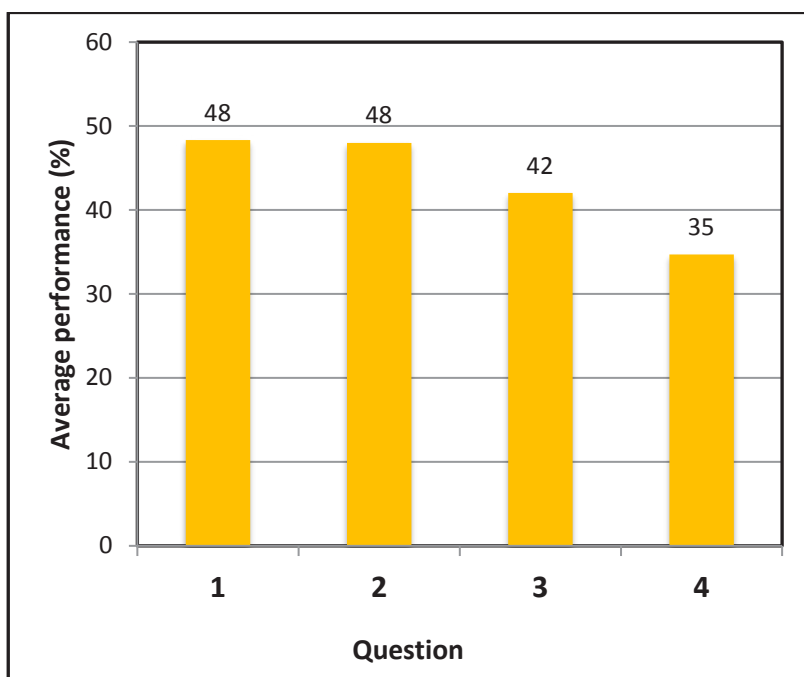
Q	Topic
Q1	Short questions
Q2	Agricultural Management & Marketing
Q3	Production Factors
Q4	Agricultural Genetics

Graph 3.7.2: Average Marks per Subquestion Expressed as a Percentage for Paper 2

Subquestions		
1.1 Multiple choice	56	
1.2 Match type	71	
1.3 Terminology	23	
1.4 Replacement	33	
2.1 Business plan	40	
2.2 Setting prices and promoting...	43	
2.3 Demand and supply	52	
2.4 Entrepreneurial process	20	
2.5 Functions of marketing	56	
2.6 Free marketing system	58	
2.7 Equilirium price of produce	56	
3.1 Management skills	42	
3.2 Income statement	49	
3.3 Capital as production factor	36	
3.4 Labour as production factor	50	
3.5 Land as a production	34	
4.1 Complete dominance	67	
4.2 Dihybrid crossing	43	
4.3 Variation and selection	34	
4.4 Breeding systems	27	
4.5 Punnet square	43	
4.6 Polygenic inheritance	15	
4.7 Genetic modification	24	
FINAL TOTAL	44	

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 Q1.1.3 some candidates failed to differentiate between *elasticity of demand* and *elasticity of supply*. Many selected price elasticity of supply instead of elasticity of demand as an answer. This is an indication that candidates did not read and understand the question.

(b)   Q1.1.4 was poorly answered by most candidates. They did not differentiate between *green marketing* and *examples of green marketing*. Most chose green marketing instead of ecolabelling.

(c)   In Q1.1.6 many candidates mistakenly linked an electric fence to production capital. Other candidates selected a milking machine, which is a device used during milk collection, as production capital.

(d)   Although Q1.1.8 was answered reasonably well, some candidates failed to identify the statement that was not a characteristic of land. Many candidates chose 'soil is durable' instead of 'soil is destructible'.

(e)   Q1.1.9 was poorly answered as most candidates failed to distinguish among *family selection*, *mass selection* and *pedigree selection*. The problem could have been that candidates were not well prepared on artificial selection.

(f)   Most candidates answered Q1.2.2 poorly because they chose 'elasticity of demand' instead of 'surplus'. The question was on the quantity of products offered that exceed the quantity required.

(g)   Q1.2.4 was poorly answered as many candidates failed to distinguish among the different costs that incur in a farming enterprise. These candidates chose option G instead of option A. Overhead costs are not limited to a specific enterprise.

(h)   Many candidates failed to differentiate between *marketing approaches* and *marketing systems*. In Q1.3.1 they chose free marketing as an approach, focussing on the needs of a small portion of mainstream customers.

(i)   Q1.3.3 was poorly answered by some candidates. They provided records, probability and biolistic instead of biometrics as a correct answer.

(j)   Many candidates were confused between similar concepts in Q1.4.1. These candidates wrote entrepreneurship instead of entrepreneur.

(k)   Some candidates were creative, but in the wrong way in Q1.4.2. Most common responses were: 'less capitalisation' and 'small capitalisation' instead of 'undercapitalisation'.

(l)   Q1.4.3 required the use of transference of genes. Some candidates wrote biolistics, which is a process and not an apparatus. Other candidates wrote 'gun gene' instead of a 'gene gun'.

Suggestions for Improvement

(a)   Basic knowledge of subject terminology remains important. Learners should be explicitly taught subject terminology.

(b)   Assessment of terminology could be made interesting. Speed tests on crossword puzzles and matching items could be used.

(c)   Learners should be encouraged to have a terminology bank of the various concepts pertaining to the subject.

(d)   Teachers should give learners practice in responding to 'replacement' questions. This can be done through class tests.

QUESTION 2: AGRICULTURAL MANAGEMENT AND MARKETING

Common Errors and Misconceptions

(a)   Q2.1.1 required candidates to give reasons for drawing up a business plan. Most candidates gave responses that were too generic. It is an indication that candidates have problems with subject terminology.

(b)   In Q2.1.2 some candidates were not able to interpret that the question required the 4 Ps of marketing.

(c)   Q2.1.2 was poorly answered in that many candidates failed to name factors that a farmer should consider when setting a price. They mistook these factors with factors to be considered when developing a market.

(d)   Most candidates could not score all 6 marks in Q2.3.1. Even though there was a gradual improvement in the drawing of graphs, the main challenge was the identification of dependent and independent variables. Some candidates struggled with the calibration of the axes.

(e)   In Q2.3.2 some candidates did not understand the trend between supply and demand within the given time frame. Instead they explained the law of demand and supply. Other candidates divided the time frame into two (2015 to 2016 and 2017 to 2018).

(f)   Many candidates were unable to derive the entrepreneurial phases from the flow chart in Q2.4. It was clear that they knew the phases but could not interpret the descriptions.

(g)   Most candidates assumed that Q2.5.1(b) required a cool place. The question was on storage as a marketing function. The candidates wrote down 'cooling facilities' as an answer.

(h)   Q2.6.1(a) referred to the sale of spinach. Some candidates opted for fresh produce market in response to the question.

(i)   Some candidates were unable to identify the supply curve and the demand curve as depicted in the graph provided in Q2.7.1.

(j)   In Q2.6.2 most candidates wrote on the advantages of free marketing instead of the disadvantages.

(k)   Some candidates were unable to accurately define equilibrium price in Q2.7.2. They defined market equilibrium instead.

Suggestions for Improvement

(a)   Teachers should expose learners to all possibilities relating to graphs, tables, flow charts and give learners practice in making deductions from either a graph, scenario or table.

(b)   Teachers should make use of previous question papers to demonstrate to learners how they can use information effectively.

(c)   Teachers should expose learners to all marketing concepts that are linked to agricultural produce.

(d) It is very important to teach content holistically and not per topic. This will make it easy for learners to see the connection amongst 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 under retailing.

(e) Using real-life scenarios in the teaching of marketing systems will enable learners to differentiate between the *advantages* and *disadvantages*.

(f) As in the previous years, the drawing of a graph was still a challenge. 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. Emphasis should also be on correct calibration. 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 in plotting

QUESTION 3: PRODUCTION FACTORS

Common Errors and Misconceptions

(a) In Q3.1.1 many candidates were unable to correctly identify the production factor as depicted in the graph. Some gave 'capital' as the answer since the data referred to financial management capability. Others wrote 'farmer' since he/she had higher capability in that skill.

(b) Most candidates based their responses on management principles and/or entrepreneurial success factors in Q3.1.2. The question was on management skills.

(c) In Q3.2.1 some candidates could not distinguish among different types of financial documents (balance sheet, income statement, cash flow statement, budget and cash analysis book).

(d) Some candidates were unable to differentiate between variable and fixed costs and their examples. Other candidates went to the extent of aligning examples of fixed costs with variable costs. Candidates were not aware that costs are found in the expenditure column.

(e) In Q3.2.3 many candidates failed to calculate the income from tomatoes. They did not understand the question and hence they added the income from all products.

(f) Most candidates were unable to identify the type of credit in the scenario in Q3.3.1. It was observed that candidates were unable to differentiate between *short-term credit/loan* and *medium-term credit/ loan*. This resulted in their inability to calculate the interest of the loan in Q3.3.2.

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(g)   In Q3.3.3 many candidates failed to calculate the net income. Some who were able to calculate the net income did not indicate the profitability aspect.

(h)   Many candidates failed to identify the production factor presented in the diagram in Q3.4.1. Many wrote 'management' instead of 'labour'.

(i)   In Q3.5.1 some candidates confused *economic* characteristics of land with *functions* of land. As a result, they could not explain the law of diminishing return.

(j)   In Q3.5.2, some candidates could not name the functions of land. They left out the essential parts of diminishing return (increase, constant and decline).

Suggestions for Improvement

(a)   Teachers are advised to regularly expose learners to data response questions (case studies, diagrams, flow charts, graphs) in their daily assessment as these types of questions will encourage creative thinking.

(b)   Learners should be advised on how to approach a question so that they respond to what is being asked.

(c)   In the teaching, learning and assessment of financial documents (balance sheet, income statement, cash flow statement, budget and cash analysis book), all aspects should be considered as prescribed in the *CAPS* document.

(d)   Teachers should regularly assess learners on calculations (net income, interest, profit).

(e)   Learners should also be taught and assessed on aspects that do not regularly appear in question papers (risk management strategies and forces influencing the farming business).

(f)   Subject advisors should conduct content gap workshops to strengthen the knowledge and skills of teachers.

QUESTION 4: BASIC AGRICULTURAL GENETICS

Common Errors and Misconceptions

(a)   In Q4.1.2 some candidates failed to provide a suitable reason for the answer to Q4.1.1. They referred to Bb (genotype) rather than to black being dominant.

(b)   Although some candidates performed well in Q4.2, there were common errors. In Q4.2.1 some candidates wrote 'hybrid' cross, which indicates a lack of understanding of subject terminology. Some candidates also referred to 'Punnet square'.

(c)   In Q4.2.3, some candidates wrote only 'green' and 'rough' as the possible phenotype of the F_1 generation. They did not realise that the question required the F_2 phenotypes as outlined in the Punnet square. To provide a phenotype, the expected answer should be based on what you see and not the arrangement of genes. (GGRR) which then becomes the genotype and not phenotype as required.

(d)   In Q4.3.1 some candidates confused *variation* and *mutation*.

(e)   In Q4.3.3 several candidates confused types of selection with methods of selection, referring to for example, family and progeny selection rather than artificial and natural selection.

(f)   Some candidates referred to the breeding system in Q4.4.1 as outcrossing or outbreeding. This was followed by incorrect responses to Q4.4.2 and Q4.4.3 due to having Q4.4.1 incorrect.

(g)   Candidates responded poorly to Q4.5. Many candidates earned a mark for the Punnet square and some could identify the female gamete. Many candidates were unable to identify the gametes of the ram. Other candidates failed to separate the gametes and tried to complete a dihybrid cross.

(h)   In Q4.6 most candidates did not understand the word 'additive', which posed a challenge in answering the whole question. From the responses, it was clear that candidates did not understand polygenic inheritance.

(i)   In Q4.7 candidates confused GM techniques with reproduction techniques and wrote answers such as cloning, artificial insemination and embryo transfer.

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 also 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 amongst the different systems.

(c)   Emphasis should be given to the patterns of inheritance that lead to different genotypes: incomplete dominance, co-dominance, complete dominance, multiple alleles, polygenic inheritance and epistasis.

(d)   Learners should practice the separation of gametes in both the monohybrid and dihybrid cross and teachers should emphasise the role of meiosis in the process.

(e)   Special attention should be given to the correct completion of the Punnet square.

(f)   Teachers should make learners aware of the correct symbols for the male (♂) and female (♀) parents.

(g)   Subject advisors should conduct content workshops to address shortcomings in the content area related to genetics.

(h)   Exposure to genetic manipulation and the techniques involved should be shown to the learners in a visual manner such as slide shows, videos and scientific literature.

Chapter 4

BUSINESS STUDIES

The following report should be read in conjunction with Business Studies question paper of the November 2019 Examinations.

4.1 PERFORMANCE TRENDS (2015–2019)

The number of candidates who wrote the Business Studies examination in 2019 decreased by 5 299 compared to that of 2018. However, there was a pleasing improvement in the pass rate this year. Candidates who passed at the 30% level comprised 71% of the cohort in comparison to 65,9% in 2018. Candidates who achieved more than 40% in 2019 comprised 46,2% of the cohort compared to 40,1% in the previous year.

The 2019 results halted the declining trend of the past four years. An increase in the level of performance could be attributed to an improved quality of teaching and assessment in the classroom, and to teachers and subject advisors who may have developed and implemented creative intervention strategies.

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
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
2019	186 840	132 571	71,0	86 242	46,2

The past five years have reflected a gradual decline in the overall results. However, encouraging improvements have been noticed in 2019, particularly in certain main topics such as Business Environments, Business Ventures and Business Roles. Many candidates did not perform well on Quality of Performance and some did not choose this topic. Teachers should note that this topic will always be assessed in all NSC/SC papers, as it forms part of Business Operations as a main topic. Moreover, it will be compulsory for all learners to answer this topic in the 2020 NSC Paper 1.

Graph 4.1.1   Overall Achievement in Business Studies (Percentage)

	2015	2016	2017	2018	2019
■ % achieved at 30% and above	75.7	73.7	68.0	64.9	71.0
■ % achieved at 40% and above	51.4	49.5	42.7	40.1	46.2
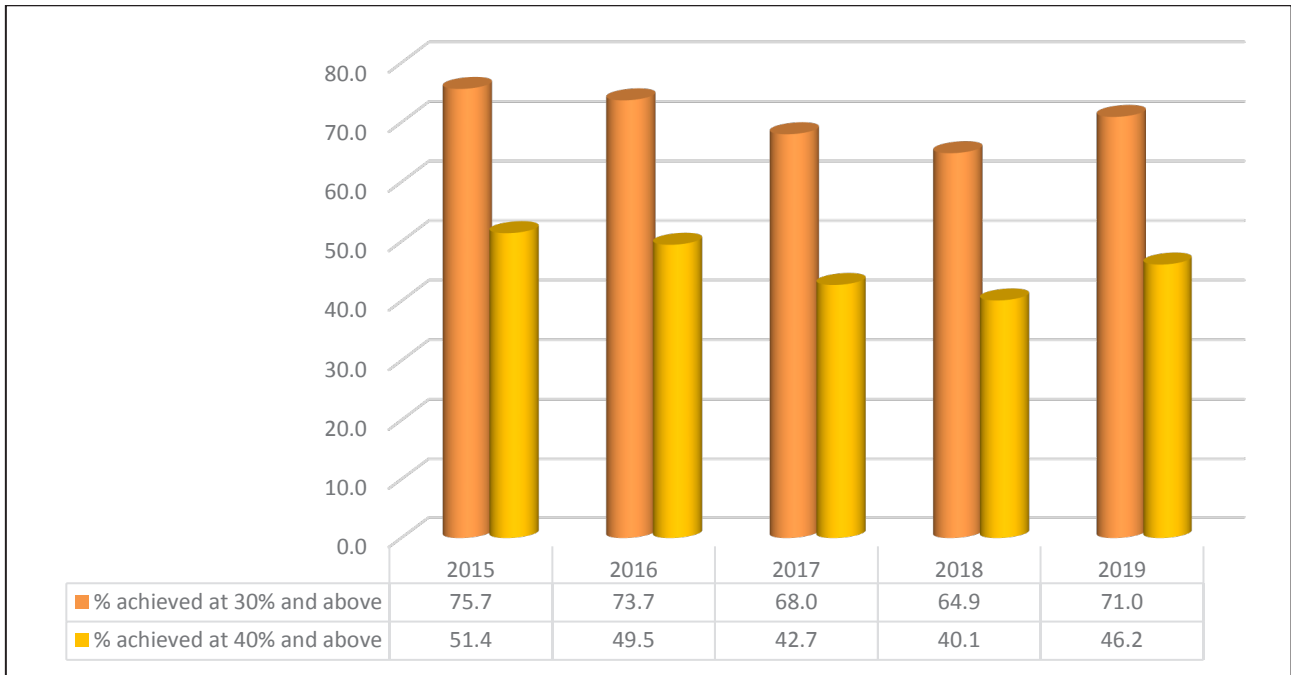
Graph 4.1.2   Performance Distribution Curve in Business Studies (Percentage)

	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
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
2019	1.1	9.1	18.8	24.8	19.8	13.2	7.8	3.8	1.3	0.2
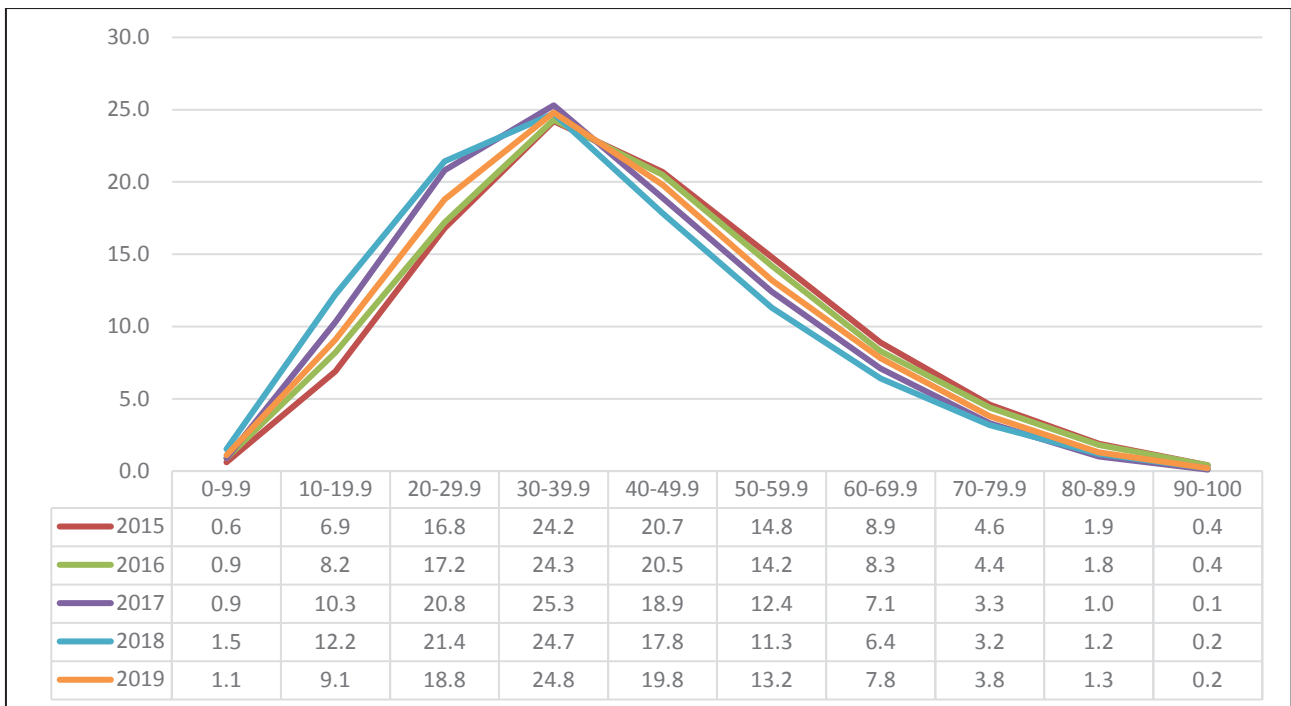
4.2 OVERVIEW OF LEARNER PERFORMANCE

General Comments

(a)   Section A, Q1.1 and Q1.2, was generally not answered well by some candidates. Many of these questions required a combination of basic content knowledge and insight.

(b)   It is still evident that candidates are not familiar with relevant action verbs, especially in Section B questions. They continue to 'name' instead of 'explain/discuss', and subsequently lose marks on these questions.

(c)   Many candidates lost marks for failing to identify and provide the correct concepts from given scenarios to motivate their responses.

(d)   Candidates also tend to provide vague and incomplete responses to middle- and higher-order questions that require full sentences.

(e)   Essay questions (Q7, Q8 and Q9) consisting of subquestions that required candidates to name and explain certain facts were intended to be easy for weaker candidates. However, some candidates were not able to name the simple concepts as required.

(f)   The performance in the topic Business Operations (Q5, Q6 and Q10) was disappointing, especially as some subquestions also appeared in the 2018 NSC question paper. Examples include Q5.5, Q5.7, Q5.3, Q5.8, Q6.11, Q10.2, Q10.3 and Q10.5.

(g)   The inappropriate responses to questions requiring an application of knowledge and content suggests that candidates are not being exposed to indirect higher-order questions during the academic year. This concern was also noted in the 2018 diagnostic report.

(h)   Some candidates did not attempt Q5.5, Q5.6, Q5.7, Q5,8 and Q5.9. These questions were based on Quality of Performance. It appears that candidates were only adequately prepared to answer questions on the Human Resources functions (Q5.1, Q5.2, Q5.3 and Q5.4), creating the impression that Quality of Performance was not adequately addressed during the academic year.

(i)   Many candidates struggled to provide original and topical examples of the latest developments in the subject, and subsequently lost the 2 marks allocated for originality in essay questions.

General Suggestions for Improvement

(a)   Teachers are advised to include indirect questions in Section A, in both formal and informal assessment tasks. It should be noted that although Section A consists of level 1- and 2-type questions, the level of difficulty should range from easy to difficult.

(b)   It is advised that notes 12.1 and 12.2 of the 2019 November Marking Guidelines (p.6) be pasted in learners' books as they provide clear guidelines on how to respond to action verbs and to the nature and context of each question.

(c)   Informal and formal assessment tasks must include direct and indirect middle- and higher-order questions. Learners must be alerted on how these questions are marked.

(d)   The rationale behind scenarios is to assess learners' ability to quote certain facts verbatim and/or identify concepts from scenarios. As such, the motivation provided will always depend on the correct identification of concepts.

(e)   Learners must be trained to provide complete responses on questions that require middle- and higher-order thinking skills. Teachers should then mark these questions objectively using the guidelines as per note 12.1 and 12.2 of the 2019 marking guidelines. Ticks must be placed/split appropriately and regular feedback must be given to learners.

(f)   Teachers must use practical examples and demonstrations to elaborate on the meaning of concepts. This practice would assist learners with the ability to name concepts and explain their meaning.

(g)   Business Operations must be taught in detail and adequately assessed during the academic year. This topic is pitched as a compulsory component in Paper 1 in Sections A,B and C in 2020.

(h)   Past NSC question papers should be used as a guideline when setting questions. Teachers are encouraged to set new creative questions. These must, however, be used within the scope, context and nature of a question, which may vary from year to year.

(i)   Learners should be encouraged to conduct research on topics that are dynamic and require recent, up-to-date information, such as Legislation and Insurance Products.

(j)   In placing greater emphasis on the learning of appropriate terminology related to the various topics, teachers should use the following strategies to improve their teaching:

   •   Use new terms in every lesson, elaborate on the meaning and context of each and create a glossary.

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

   •   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 and when teaching.

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

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

4.3   DIAGNOSTIC QUESTION ANALYSIS

Graph 4.3.1 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.

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Graph 4.3.1   Average Performance per Question Expressed as a Percentage
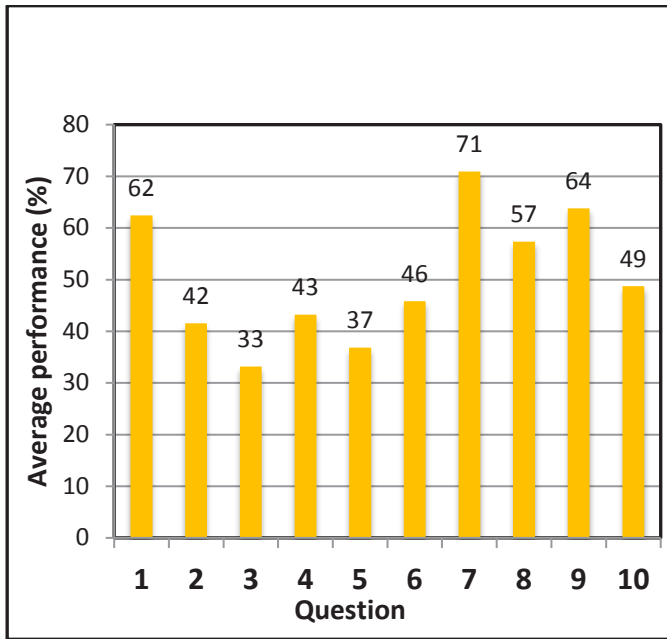
Section A: Compulsory	
Q1	Multiple choice, choosing correct words and matching columns
Section B: Choice questions (Any three)	
Q2	Business Environment
Q3	Business Ventures
Q4	Business Roles
Q5	Business Operations
Q6	Miscellaneous
Section C: Choice questions (Any two)	
Q7	Business Environment: Business Strategies
Q8	Business Ventures: Insurance & Presentation
Q9	Business Roles: Team Performance & Conflict Management
Q10	Business Operations: Quality of Performance

Graph 4.3.2 Average Performance per Subquestion as a Percentage
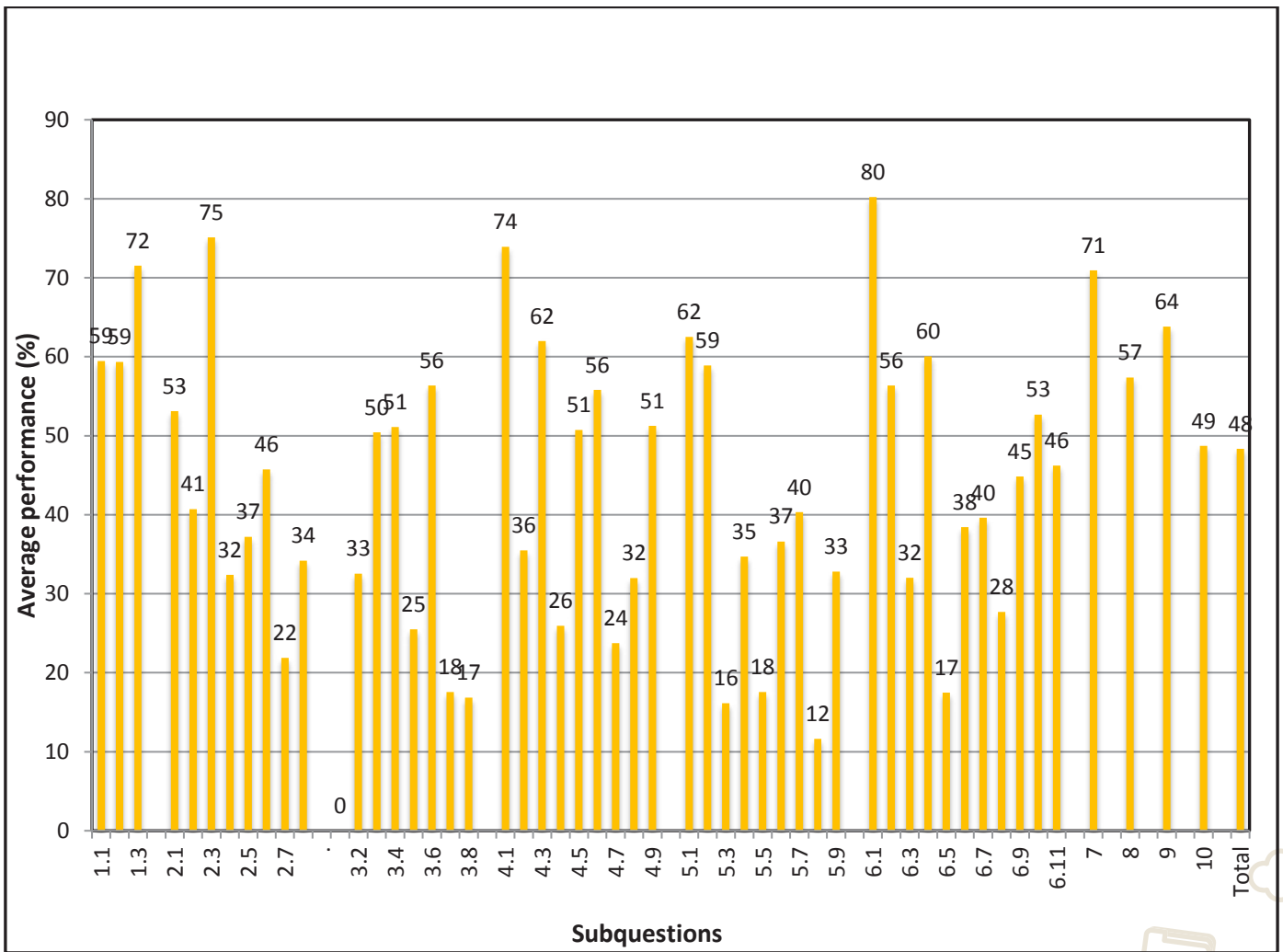
	Topics/Aspects		Topics/Aspects		Topics/Aspects
1.1	Multiple choice	3.8	Public company	5.9	Purchasing function
1.2	Missing words	4.1	Problem-solving steps	6.1	Business environments
1.3	Match columns	4.2	Health and safety reps	6.2	COIDA
2.1	Diversification strategies	4.3	Diversity issues	6.3	Investment opportunities
2.2	SETAs	4.4	Delphi technique	6.4	JSE
2.3	Leave provisions	4.5	Creative thinking	6.5	Situational leadership
2.4	LRA	4.6	CSI	6.6	Team performance
2.5	CPA consumer rights	4.7	King Code principles	6.7	HIV/AIDS
2.6	BBBEE	4.8	Unethical issues	6.8	Creative thinking
2.7	PESTLE elements	4.9	Cultural rights	6.9	PDCA model
2.8	EEA	5.1	External recruitment	6.10	Employment contracts
3.1	Preference shares	5.2	Job analysis	6.11	Induction
3.2	Unit trusts	5.3	SDA/HR	7	Business strategies
3.3	Leadership styles	5.4	Fringe benefits	8	Presentation and insurance
3.4	Importance of insurance	5.5	Quality performance	9	Teamwork/Conflict
3.5	Investment factors	5.6	Business functions	10	Total quality management
3.6	Average clause	5.7	TQM poorly implement		
3.7	Non-profit company	5.8	TQM element.		

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 was fair. Some candidates made incorrect choices, mainly due to the lack of ability to respond to questions that required an application of content knowledge and insight.

Common Errors and Misconceptions

(a)   Many candidates confused the National Credit Act/NCA with the Consumer Protection Act/CPA in Q1.1.1. The word 'consumer' in the question was incorrectly interpreted.

(b)   Poor performance was evident in Q1.1.4, as some candidates confused the laissez-fair/free-reign leadership with other leadership styles that were used as distractors in this question.

(c)   In Q1.1.7 some candidates confused the nominal group technique with brainstorming. This could be due to them not carefully reading the first part of the statement.

(d)   Many candidates had difficulty in identifying 'employee wellbeing' in Q1.1.8. Many opted for the incorrect answer of option C.

(e)   In Q1.1.10 some candidates still confused the concept of 'placement' with 'recruitment'.

(f)   Many candidates confused the responsibility of employers to provide necessary equipment for workers with the roles of health and safety representatives in Q1.2.3.

(g)   In Q1.2.4 many candidates confused the meaning of 'quality' with 'quality management system', possibly due to this question being asked for the first time in the Grade 12 NSC examination, even though it is covered in Grades 10 and 11.

(h)   Many candidates confused the meaning of 'ethical behaviour' with 'professional behaviour' in Q1.3.3. It is evident that teachers have not implemented recommendations on how to teach this content as outlined in the 2015–2017 national diagnostic reports on learner performance.

Suggestions for Improvement

(a)   A clear distinction must be made between the NCA and CPA in terms of the purpose of EACH Act. It must be emphasised that the NCA focuses on credit granting, while the CPA focuses on 'products and marketing'. This will enhance learners' understanding of the content and the purpose of each Act.

(b)   The differences between types of leadership styles must be clearly outlined. The focus must be on the meaning and application of each leadership style. Practical examples and demonstrations can be used to illustrate how each style would be applied in a business.

(c)   It is essential that learners grasp the meaning of the nominal group technique before they are taught the application of this technique. Key words such as 'silent/small' and 'aloud/large' can be effectively used to distinguish between the nominal group technique and brainstorming respectively.

(d)   Teachers must include questions that relate to recommendations and suggestions when addressing the formal or informal assessment tasks in Section A.

(e)   Human resource activities must be taught in a sequential order and the link between these activities should be clearly illustrated. The 2020 examination guidelines refer to this aspect.

(f)   In teaching health and safety representatives, teachers must spend time explaining the meaning before proceeding to their roles in protecting the workplace environment. Learners must realise that, as the health and safety representatives are also employees, it would not be their responsibility to provide protective clothing gear and to maintain equipment. They are, however, expected to ensure that the employer perform these tasks.

(g)   All concepts related to 'quality' must be taught in detail using practical examples to enhance understanding.

(h)   The school's code of conduct can be used as a real-life example to explain the differences between ethics and professionalism.

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 was average, even though this question only consisted of three subtopics as per the CAPS requirements.

Common Errors and Misconceptions

(a)   In Q2.1 many candidates were able to name the types of diversification strategies, but some confused these strategies with integration strategies.

(b)   Candidates had difficulty in outlining the role of SETAs. They confused this topic with either the purpose or advantages of the Skills Development Act in Q2.2. Some responses incorrectly focused on how SETAs are funded. Others responses were vague and incomplete. The action verb, 'Outline' required candidates to write complete sentences.

(c)   In Q2.3.3 many candidates did not write the full name of family responsibility leave, as many responses were based on 'family leave'. Others could not identify 'annual leave' from the given statements.

(d)   Poor performances was noted in Q2.4 as many responses were based on the functions of trade unions and also on the rights of employees according to the Labour Relations Act. Some candidates confused this question with the purpose of the Employment Equity Act.

(e)   Some candidates did not correctly mention consumer rights as stipulated by the Consumer Protection Act in Q2.5. The explanation of each right was used as a heading instead of naming the consumer right. Others confused consumer rights with either human rights or consumer rights in terms of the National Credit Act/NCA.

(f)   While some candidates were able to identify the Broad-Based Black Economic Empowerment (BBBEE) in Q2.6.1, they missed the word 'economic' or 'empowerment'.

(g)   In Q2.6.2 many candidates confused ownership with 'employment equity'. It appears that the word 'previously disadvantaged' people is always associated with the 'Employment Equity Act' (EEA). While some confused 'ownership' with 'management', others simply mentioned 'shares' instead of 'ownership'.

(h)   Many candidates did not attempt to answer Q2.7. Those who answered this question focused on the impact of crime as the only social challenge to businesses. Some simply gave examples of economic and social factors, while others suggested strategies on how businesses could deal with these factors. Many candidates merely explained the meaning of socio-economic issues instead of how they pose challenges to businesses.

(i)   Q2.8 was poorly answered by many candidates despite the fact that it has been asked many times in previous NSC examinations. Some responses made incorrect references on how businesses could deal with diversity issues in the workplace.

Suggestions for Improvement

(a)   Learners must be encouraged to use practical examples when explaining the meaning of diversification and integration strategies. Teachers should explain the rationale for the implementation of these strategies to enhance their understanding.

(b)   It should be clearly explained that SETAs are the implementers of the Skills Development Act, as they devise systems for its operation. Learners must be made aware that SETAs do not provide training. Key words such as 'sector skills plan', 'grants', 'monitor', 'learnerships' and 'training material' can be used to assist learners to formulate meaningful statements on this topic. There is a need for subject advisors to conduct follow-up workshops on this topic, as candidates' performance is still poor despite the question being asked in the 2018 November examination.

(c)   Learners must be taught to write the correct and full name of each provision of the BCEA. Direct and indirect assessment methods can be effectively used in providing learners with the necessary skills to identify these provisions from the given statements and scenarios. Alternative and incomplete responses must not be accepted during the academic year.

(d)   Teachers must address the Labour Relations Act within the framework of the relationship between the employer organisation and trade unions and not through the functions of the latter. It must be stressed that the main aim of this Act is to promote labour peace in the workplace rather than to focus on lockouts and strikes.

(e)   The difference between the Consumer Protection Act and the National Credit Act must be clearly outlined and explained. This should afford learners a better understanding of consumer rights as they apply to the CPA and NCA.

(f)   The rationale behind the pillars of BBBEE is to ensure full participation of the previously disadvantaged people in the economy of the country. Learners must be informed that all eight Acts are aimed at redressing past imbalances. As such, the phrase 'previously disadvantaged people' is likely to be used in all these Acts. Source-based and indirect questions must be administered to address this topic during the academic year.

(g)   Teachers must devise strategies to illustrate how PESTLE factors can pose challenges to businesses and initiate class discussions for suggestions to deal with challenges. It must be pointed out that quoting examples of PESTLE factors is covered in Grade 10 and will not meet the level of complexity expected in the Grade 12 context.

(h)   The purpose and the impact of the Employment Equity Act must be understood by learners before dealing with the ways in which businesses can comply with this Act. Short class tests must be used to determine progress before moving to subsequent sections.

QUESTION 3: BUSINESS VENTURES

Performance of candidates ranged from poor to average. Four of the subquestions, which added to 32 of the 60 marks, were not asked in NSC question papers over the past three years. This could have contributed to the poor performance noted.

Common Errors and Misconceptions

(a)   Although candidates generally performed well in Q.3.1, some confused the types of preference shares with the types of shares.

(b)   In Q3.2 many candidates provided vague and general statements on the advantages of unit trusts. While some candidates based their responses on either advantages of savings or managed portfolio, others explained the meaning of unit trusts and the functions of the RSA Retail Savings Bonds.

(c)   Many candidates provided unclear responses on the impact of the democratic leadership style in Q3.3.2. Some incorrectly linked the democratic leadership style with the role of personal attitude or confused it with the autocratic leadership style. It appears that candidates were not familiar with the style of setting, whereby the follow-on question is independent of the scenario.

(d)   Some candidates repeated facts on the advantages of insurance and some responses were based on the meaning of reinstatement and indemnification in Q3.4. Some responses were based on the advantages of insurance on individuals instead of businesses. Some candidates confused this question with either the principles of insurance or COIDA as a compulsory insurance.

(e)   Many candidates did not attempt Q3.5.1 Those who did, confused the meaning of return on investment with the period of investment.

(f)   In Q3.5.2 some candidates could not elaborate on the meaning of 'liquidity', while others confused this concept with the meaning of 'liquidation' as a business strategy.

(g)   A small percentage of candidates did not attempt Q3.6.1. A common error noted was the confusion of the average clause with under-insurance, even though the word 'clause' appeared on the question.

(h)   In Q3.6.2 many candidates used the incorrect formula of dividing the market value by the insured value, to calculate the average clause. This error resulted in the loss of 4 marks, as it affected the final answer. Candidates who got the final answer incorrect also neglected to provide the formula and show workings.

(i)   Poor performance was observed in Q3.7 as many candidates confused the advantages of a non-profit company with the state-owned company. Others confused this question with the impact of CSI on businesses.

(j)   Many candidates did not attempt to answer Q3.8. Some simply provided general statements on the contribution of management and legislation to the success and/or failure of a public company. Some responses focused on the characteristics of a public company and failed to link them to success and/ or failure factors. Only a few candidates were able to explain how these criteria would influence the success and/or failure of a public company. Some inappropriate and irrelevant responses included the differences between 'management' and 'leadership' and the duties of a manager.

Suggestions for Improvement

(a)   The different types of preference shares and types of shares must be tabulated and discussed. Learners' ability to list, state, name and explain the different types of preference shares and to identify these concepts from given statements/scenarios can be assessed through aspect testing. Practical examples and demonstrations are also useful tools to achieve the desired level of understanding.

(b)   The differences between unit trusts and RSA Retail Savings Bonds must be clearly explained. Key words such as 'risk', 'registration', 'access', 'amount' and 'interest' must be used to differentiate between these types of investments.

(c)   The definition of each leadership style and the settings in which each style can be applied must be adequately taught and assessed during the academic year. This will enhance learners' understanding of the impact of each style in the business environment.

(d)   Teachers should focus on the importance and advantages of insurance on businesses rather than on individuals. Terms such as 'transfer of risks' and 'protect businesses' must be explained in the relevant context, with the emphasis being on how businesses benefit from insuring their assets. Here again, it is vital that learners be encouraged to write full sentences when explaining the importance of insurance.

(e)   Investment decision factors must be linked to the decisions to invest. Teachers must provide examples of types of investment that are relevant to each investment decision. Learners can also take responsibility for their own learning to conduct research on each type of investment so that they can better understand the link between investment decisions and types.

(f) Teachers should make learners aware that the concepts of 'liquidity' and 'liquidation' are from entirely different topics, although they are almost similar in pronunciation but the meaning is different.

(g) It must be emphasised that the term 'average clause' is applied when goods or assets are underinsured. Learners are expected to be able to calculate the average clause using the correct formula, i.e. the amount insured divided by the value of the property multiplied by the damage. The reason for starting with the amount insured should be explained, as this indicates the impact of under-insurance. Learners must be reminded that the formula and the workings are allocated part-marks and must be clearly shown.

(h) Teaching and learning should also focus on the impact of non-profit companies with specific reference to key words such as 'income', 'donations', 'tax', 'existence', 'grants', 'directors' and 'legal personality'. It is important to note that this form of ownership is different from the state-owned companies, even though some NPCs also provide essential services at no cost.

(i) The criteria that contribute to the success and/or failure of each form of ownership must be explained in conjunction with their respective characteristics, advantages and disadvantages. It is, therefore, imperative that teachers recap and revise the latter before teaching the success and/or failure factors in each form of ownership.

QUESTION 4: BUSINESS ROLES

This question was a popular choice, probably due to many subquestions being asked in recent past papers, albeit phrased differently. The performance ranged from fair to good.

Common Errors and Misconceptions

(a) Although Q4.1 was answered well by many candidates, some confused the problem-solving steps with either the problem-solving techniques or conflict resolution steps. Some responses were based on either the strategic management process or stages of team development, which appear in Q9 of this paper.

(b) Many candidates confused Q4.2 with either the responsibility of employers in protecting the workplace environment or strategies on how businesses can promote the health and safety of employees in the workplace.

(c) In Q4.3 some candidates could not correctly identify the diversity issues applicable in the given scenario. They lost marks for motivation that were not linked to the diversity issue.

(d) Many candidates could explain the application of a Delphi technique in the workplace, but provided incomplete responses in Q4.4 and lost valuable marks. Some responses were inappropriately based on either the advantages of the Delphi technique or creative thinking in the workplace. Others incorrectly perceived employees as experts who must complete a questionnaire.

(e)   In Q4.5 many candidates provided vague, incomplete responses on the advantages of creative thinking in the workplace. Some simply discussed the importance of brainstorming, which was not a requirement of the question. Certain responses were limited to 'employees bring new and innovative ideas', and others on the 'benefits of diversity in the workplace'. This topic has been a challenge since the inception of NCS and NSC/CAPS.

(f)   Poor performance was noted in Q4.6.2 as some candidate confused the impact of CSI on businesses with communities. Others provided incomplete responses, such as increased profitability and market share. There were also instances where candidates either repeated words that were used in the scenario or gave other examples of CSI projects. These were not relevant to answering this question.

(g)   Many candidates showed little or no understanding of how transparency and accountability can be applied in the workplace in Q4.7. Other responses on accountability made reference on how to attract investors. Some candidates simply explained the meaning of 'transparency'. There were a few who did not attempt this question.

(h)   In Q4.8.1 many candidates provided punitive strategies on how businesses can deal with pricing of goods in the rural areas and abuse of work time. They were only awarded a maximum of 2 instead of 4 marks for an incomplete answer. Some responses incorrectly focused on how to increase sales or decrease prices of goods in rural areas.

(i)   Some candidates misinterpreted Q4.8.2 by providing the provisions of the Basic Conditions of Employment Act (BCEA) in terms of hours of work.

(j)   Some candidates had difficulty in making recommendations on how businesses could promote cultural rights in the workplace in Q4.9. Responses were limited to 'cultural activities that must be allowed in the workplace'. Many candidates continue to base their answers on 'allowing employees to practise their culture in the workplace', even though recommendations were made in the 2016 and 2017 diagnostic reports that this fact will not be relevant in this context. Other incorrect responses included the cultures of candidates.

Suggestions for Improvement

(a)   There are similarities between the problem-solving steps and the strategic management process in terms of formulating, implementing and monitoring the strategy. However. the problem-solving steps focus on how businesses can solve problems, while the strategic management process focuses on developing suitable strategies to respond to the challenges posed by business environments. This process looks at challenges that are caused by both internal and external factors.

(b)   Teachers are advised to commence with this topic by addressing the responsibilities of employers in protecting the workplace environment before proceeding to the roles of the health and safety representatives in protecting the workplace environment. Learners must be advised that the latter serve as ombudsmen for their members; they do not provide safety measures but they ensure that employees are provided with safety.

(c)   Learners must be exposed to various scenarios and they must be guided on how to respond to questions that are based on these scenarios. In providing regular feedback, learners must be exposed to the marking principles applied to such scenarios.

(d)   Learners should be encouraged to write full sentences when responding to how the Delphi technique should be applied in the workplace. It should be noted that the words 'questionnaire and feedback report' appears three times in the marking guidelines, but in different contexts. Learners can easily obtain marks if they understand the nature and context of these concepts.

(e)   Teachers are advised to identify key words that could assist learners to elaborate on the advantages of creative thinking in the workplace. Creative thinking benefits both the business and employees. This topic should not be confused with the benefits of diversity in the workplace as the focus is on the advantage of new and innovative ideas rather than diversity.

(f)   Businesses are expected to measure the impact of CSI projects on their operation. Therefore, learners must be able to explain how these projects benefit businesses instead of giving examples of CSI projects.

(g)   The meaning of 'transparency' and 'accountability' must be explained within the King Code principles for good corporate governance. Teaching and learning must focus on how businesses should apply the three principles that are stated in the 2020 examination guidelines. To recap, 'transparency focuses on reports, processes and policies', while 'accountability focuses on management, shareholders and auditors'. These key words should be used to explain how businesses can apply these principles in the workplace.

(h)   Learners must be advised to refrain from writing negative strategies on how businesses can deal with each type of unethical and unprofessional business practice. They need to understand the reason why these issues are regarded as unethical or unprofessional. This will enable them to suggest ways in which businesses can deal with each issue.

(i)   Teachers are advised to also focus on other ways in which businesses could promote cultural rights in the workplace. The recommended responses should be to 'encourage employees to participate in cultural activities'.

QUESTION 5: BUSINESS OPERATIONS

This topic comprises of only two subtopics. Performance of candidates in this question ranged from average to poor. Many candidates only answered questions on Human Resources and did not attempt the questions on Quality Performance.

Common Errors and Misconceptions

(a)   Many candidates were able to name the sources of external recruitment in Q5.1 but some listed the human resources activities. Others repeated answers using irrelevant examples.

(b)   In Q5.2.1 many candidates quoted the correct examples of job description and job specification from the scenario. Others simply copied the statements in the scenario without classifying them under the correct heading.

(c)　Some candidates confused the role of the interviewee with the role of the interviewer during or before the interview in Q5.2.2. Other responses were based on factors that must be considered when doing a presentation.

(d)　Many candidates did not attempt Q5.3. This topic is also covered under Business Environment. Some responses were based on either the advantages, impact or the purpose of the Skills Development Act on businesses. Many responses were only based on 'train employees'. Others confused this question with the role of SETAs.

(e)　Good performance was noted in Q5.4, even though some candidates' responses were based on the benefits of the Unemployment Insurance Fund (UIF) as a compulsory benefit. Other responses were based on the examples of fringe benefits.

(f)　In Q5.5 many candidates were not able to explain the meaning of 'quality performance'. Some candidates simply copied the meaning of 'quality' from Q1.2.4, even though this was not the correct response. Others confused the meaning of this concept with either quality assurance or control. Most responses were limited to one fact, although this question required candidates to elaborate on this concept.

(g)　Many candidates had difficulty in identifying the correct business function from the scenario in Q5.6. Some stated 'finance function' instead of 'financial function' and others listed the elements of TQM. There were also incidences of the financial function being confused with the administration function mainly due to the word 'record' being read out of context.

(h)　The only shortcoming noted in Q5.7 were the incomplete responses presented. A few candidates confused this question with the quality indicators of the production function.

(i)　Q5.8 was perceived as a difficult question and consequently not attempted by a large percentage of candidates. Those who answered this question provided general statements on the advantages of continuous improvement to processes and systems. Many responses incorrectly identified 'increased customers' as a benefit.

(j)　Although the majority of the candidates performed well in Q5.9, some responses were based on the advantages of quality in general.

Suggestions for Improvement

(a)　Learners must be made aware that certain examples of external recruitment fall under the same category and marks will be lost if these are repeated. Furthermore, a clear distinction must be made between the sources of internal and external recruitment, as well as between the sources and methods of recruitment. Teachers are advised to make use of columns and tabulations when teaching these topics.

(b)　Scenarios, statements and employment advertisements are useful tools that teachers should use to explain the differences between 'job description' and 'job specification'. They should also provide a detailed description of these concepts.

(c) Learners must recognise the difference between the words 'interviewer' and 'interviewee' in relation to the roles of each party during an interview. Practical demonstrations and role-playing activities can be used to enhance understanding. The use of a two-column table listing the differences between the roles of the interviewer and interviewee will assist learners to apply this knowledge to specific scenarios and extracts used in assessment tasks.

(d) Teachers must revise the different ways in which businesses should comply with the SDA, LRA, BCEA and EEA before teaching the implications of these Acts on the human resources functions. It should be emphasised that the HR function does not train employees, but assists managers in identifying employee training and development needs. The word 'implications' in this context would refer to compliance, as the focus is on how the human resources function should comply with each of the above-mentioned Acts in the workplace.

(e) Learners must be alerted to the fact that businesses would offer lucrative fringe benefits to attract and retain skilled and competent employees. As a practical application exercise, learners must be requested to Google or research different examples of benefits offered by businesses and report on their impact.

(f) In accepting that the main aim of quality performance is to measure the performance of each function, the teacher must emphasise that every business function is responsible for ensuring that the final product or service is of a good quality standard. A clear distinction must be made between all concepts related to quality, as indicated in the 2020 examination guidelines. Practical examples and video clips can be used to further illustrate the distinctions between each quality concept.

(g) The teaching and learning process should focus on the quality indicators of each business function. Grade 10 and 11 teachers are expected to provide learners with detailed descriptions, which will be extended in the Grade 12 academic year through adequate instruction and assessment activities.

(h) Businesses that continuously improve their systems and processes should be used as examples when teaching this topic. The focus should be on how large businesses continually improve their systems and processes. Note that the advantages of this element focus on businesses, while the disadvantages focus on employees.

QUESTION 6: MISCELLANEOUS

This question assesses all four main topics and consists of direct short questions. Candidates' performance ranged from average to good. It is pleasing to note that this is the first time that candidates' performance improved in the miscellaneous question.

Common errors and misconceptions

(a) Many candidates were able to name the three types of business environments in Q6.1. Some confused the extent of control over each business environment.

(b) In Q6.2.1 many candidates were able to identify the Compensation for Occupational Injuries and Diseases Act (COIDA) in the scenario, even though some missed one word in the name. Others confused COIDA with the Occupational Health and Safety Act (OHSA).

(c) Poor performance was noted in Q6.2.3 as the majority of candidates' responses were limited to either 'payment of fines' or 'imprisonment'. Some candidates simply stated that 'businesses will shut down'.

(d) Although Q6.3.1 was generally answered well, some candidates confused the concept of 'fixed deposits' with 'compound interest'. Others offered a calculation instead of naming the concept.

(e) Many candidates performed well in Q6.4 even though some responses related to 'selling shares'. Others confused the word 'securities' with a 'security company', thus affecting the essence of their responses. Some candidates confused this question with the functions of the SA Reserve Bank, a topic that is covered in Economics.

(f) In Q6.5 the majority of candidates provided only one fact on the situational leadership theory. Some either explained the leadership styles or the qualities of an entrepreneur. The poor quality of responses was disappointing, as this question has been asked many times in past NSC examinations.

(g) Q6.6 was answered well by many candidates, even though some responses were based on the characteristics of successful teams.

(h) Although many candidates performed well in Q6.7, some provided very general statements on strategies to deal with HIV/Aids. While others provided negative strategies on dealing with HIV/Aids. These were not relevant. Some candidates went off the topic and offered general ways of dealing with socio-economic issues.

(i) The majority of candidates had difficulty responding to Q6.8. They confused the advantages of creative thinking with the application of problem-solving techniques and in some cases, with the wellbeing of employees. Candidates were expected to perform well in this question, since it has been asked many times in the NSC examination.

(j) In Q6.10.1 many candidates could not identify 'retirement' in the scenario. Some used the word 'pension' instead of 'retirement'. They lost marks for the motivation as they could not provide the correct concept applicable to the scenario.

(k) Many candidates named instead of explaining the reasons for the termination of an employment contract in Q6.10.2.

(l) In Q6.11 some candidates simply listed aspects that must be included in the induction programme and the benefits of induction instead of the purpose of induction.

Suggestions for Improvement

(a) Teachers must explain the reason why businesses may have full control, partial control or no control over the three business environments. Teachers are advised to refer to the elements or features of each business environment when explaining the extent of control over each environment. This will enable learners to identify business environments and explain the extent of control from given scenarios and statements.

(b) A clear distinction must be made between COIDA, which deals with workplace injuries and diseases, and OHSA, which deals with safety in the workplace. Learners must be reminded that OHSA was covered in Grade 11 and that they must learn and use the correct words when requested to give the full name of COIDA.

(c) As stated in other sections above, learners must be constantly encouraged to write full responses on how businesses can comply with the eight Acts. In addressing the compliance to Acts, it will be necessary to elaborate on the reasons for 'fines' and 'imprisonment' in serious cases of non-compliance.

(d) Teachers must provide detailed descriptions of the different type of investment and ensure that this topic is adequately taught and assessed during the academic year. Learners can be requested to visit financial institutions and conduct research on types of investments, their risk factors and the impact on businesses.

(e) Learners must be encouraged to recommend correctional and positive strategies that are developmental rather than punitive in nature. This recommendation was also mentioned in previous diagnostic reports.

(f) Learners' knowledge on the situational leadership theory must be extended through the use of key words such as 'task', 'relationships' and 'analysis'. It should be noted that leaders use this theory to choose an appropriate leadership style that is relevant to current situation.

(g) A clear distinction must be made between the 'criteria' and the 'characteristics' for successful team performance. Learners are expected to name and explain the four criteria for successful teams, as outlined in the 2020 examination guidelines. The criteria for successful teams are embedded in their characteristics. It is therefore necessary to recap the characteristics first, before explaining the criteria for successful teams.

(h) Teachers must ensure that learners' knowledge on how businesses can deal with HIV/Aids are not limited to HIV awareness campaigns and programmes. Learners must also be able to suggest other relevant strategies covered in the previous grades.

(i) Teaching and learning should focus on how businesses should stimulate creative thinking in the workplace before learners are taught the advantages of creative thinking. Teachers are advised to use key words such as 'suggestions box', 'training', 'job swopping', 'experiments' and 'reward schemes' when teaching this topic. Learners could be requested to bring articles on businesses that have stimulated creative thinking in the workplace to be used in class discussions.

(j) Learners must be taught to name and explain each reason for the termination of an employment contract. They should also be informed that they will lose marks for using the word 'pension' instead of 'retirement'. It must be noted that pension is a fund and not the reason for terminating an employment contract.

(k) A clear distinction must be made between the purpose, aspects and benefits of induction. It is important to understand the purpose of induction before unpacking the aspects that must be included in an induction programme, as some vital aspects for inclusion may be embedded in the purpose. Here again, learners must be reminded to provide complete sentences when responding to questions on the purpose of induction to avoid losing marks unnecessarily.

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

QUESTION 7: BUSINESS ENVIRONMENT: BUSINESS STRATEGIES

This question appeared to be less popular as many candidates did not choose it. Those who answered this question performed very well. A possible reason for the good performance could be attributed to the fact that this question was set on business strategies instead of legislation, which is more prescriptive. It also indicates that teaching and learning of this topic is improving.

Common Errors and Misconceptions

(a)   Q7.2 revealed many incomplete responses. Some parts of candidates' responses incorrectly included problem-solving steps and strategy-evaluation steps.

(b)   In Q7.3 candidates confused the meaning of 'divestiture' with 'liquidation'. Others simply listed all types of business strategies in inappropriate contexts. In some cases, the concept 'liquidity' was used instead of 'liquidation'. Other responses were based on the types of intensive strategies, which were not asked in this question paper.

(c)   In Q7.4 some candidates were only able to name the application of the Porter's Five Forces model without rendering any valid explanation. Some simply explained the meaning of each force, while others provided strategies on how businesses could deal with each force. A significant number of candidates could not explain 'competitive rivalry and barriers to new entrants in the market'.

(d)   Many candidates still confuse the steps in evaluating a strategy with the problem-solving steps in Q7.5. This error remains a challenge, even though recommendations were made in all previous diagnostic reports on how to approach this topic during teaching and learning. Some candidates repeated the strategic management process that was written in Q7.2.

Suggestions for Improvement

(a)   The strategic management process includes all subtopics that must be taught under business strategies. It is imperative that all learners understand these processes so that they are able to understand the rationale behind the formulation and evaluation of business strategies. It should be noted that business strategies are aimed at addressing the challenges posed by business environments. This is why businesses must use the industrial analysis tools to scan these environments.

(b)   Learners must understand the meaning of 'defensive', as used in this context. Essentially, this implies that businesses are not doing well and they must develop strategies in order to survive. At this point, it will be necessary to reiterate that liquidation is not the same as liquidity. This is the reason why liquidation is regarded as the last type of a defensive strategy.

(c)   A clear distinction must be made between 'divestiture' and 'liquidation', as both strategies are aimed at selling the business assets to pay creditors. Divestiture deals with selling some unproductive business assets, while all assets are sold when the businesses become insolvent (liquidation).

(d)   Businesses apply Porter's Five Forces model in order to analyse their position in the market. It must be made clear that this model is used as a research instrument rather than strategies to increase sales and market share. The model assists businesses to answer questions such as <u>how</u> and <u>what</u> makes buyers, competitors and suppliers have power over the business. It should also be noted that the word 'power' is used three times, while 'threat' is used twice in this model. Learners should be advised that a definition of each force is not sufficient to answer this question. They must also provide valid explanations on how businesses should apply this model.

(e)   Teachers are advised to use practical examples when explaining the steps in strategy evaluation. This will enhance understanding in this regard. It is must be noted that responses such as 'formulate and implement the strategy' no longer form part of strategy- evaluation. Refer to page 10 of the 2020 exam guidelines.

QUESTION 8: BUSINESS VENTURES: PRESENTATION AND INSURANCE

Candidates' performance ranged from average to poor. This is a concern, as three of the four subtopics are perceived as less challenging and were asked in past NSC examninations.

Common errors and misconceptions

(a)   In Q8.2 some candidates confused the factors that must be considered *during* the presentation with either *before* or *after* a presentation, while others confused the roles of the interviewee during the interview.

(b)   In Q8.3 many candidates confused the principles of insurance with either examples of long-term insurance or compulsory insurance. Some responses were based on either the importance of insurance on businesses or the differences between insurance and assurance. Others could name the principles of insurance, but offered vague or incomplete explanations. Some candidates focused on insurable risks instead of insurable interest.

(c)   The majority of candidates were not able to evaluate the impact of a PowerPoint presentation in Q8.4. This topic remains a challenge in all NSC/SC examinations. Many responses were based on the impact of any type of visual aid without focusing on a PowerPoint presentation, and some responses were based on the impact of interactive whiteboards.

(d)   Many candidates performed poorly in Q8.5 even though this question was asked many times in past NSC question papers. They provided general statements and confused this question with handling feedback in a professional and non-aggressive manner. Some wrote one-word answers in this question.

Suggestions for Improvement

(a)   Teachers should explain the relationship between factors that must be considered before and during a presentation. Learners must be taught to identify the relationship between these factors to realise the logic that a presenter must first prepare a presentation before presenting it. It must be noted that the word 'visual aids' appears three times, i.e. before, during and after the presentation. Learners must know the context in which this word is used in relation to each type of presentation. They should refrain from writing 'dress code' when making a presentation, as this phrase is not acceptable.

(b)   Teachers must use relevant examples and demonstrations when teaching the principles of insurance. Identify key words that will enable learners to remember the explanation of each principle. Furthermore, teachers are advised to make four columns using simple statements when explaining each principle. Learners must be advised to include examples of each insurance principle, as this forms part of the expected answer.

(c)   All relevant types of visual aids and their impact on businesses must be taught and discussed at length. It should be appreciated that the use of visual aids serves to enhance effective presentation of business information. Learners must be provided with explanations so that they do not confuse a PowerPoint presentation with interactive smartboards. Smartboards and projectors can be used to demonstrate this difference, as well as the impact of a PowerPoint presentation.

(d)   Learners must be advised that a presenter would usually consider areas of improvement in the next presentation by evaluating the effectiveness of a previous presentation. This step is termed 'reflection'. This is why some of the points that must be considered before and during the presentation are repeated in this topic, in a different context.

QUESTION 9: BUSINESS ROLES: TEAM PERFORMANCE AND CONFLICT MANAGEMENT

Reponses to this question ranged from good to average. The question consisted of four subquestions that have all been asked in past NSC examinations. Furthermore, some subquestions required candidates to first name the fact before providing an explanation. Many candidates obtained a maximum of 15 marks just for naming facts without explanation.

Common errors and misconceptions

(a)   In Q9.2 some candidates simply used numbers to name the stages of team development. Others confused the stages of team development with the criteria for successful teams. The explanation of 'storming' was vague, as many responses were based on 'when employees start fighting'.

(b)   In Q9.3 some candidates only mentioned the causes of conflict without rendering an explanation. Some confused this question with either the grievance procedure or problem-solving steps. Others provided solutions for each cause of conflict, even though this was not required. Some explained causes of conflict that were not related to the workplace.

(c)   Poor performance was noted in Q9.4 as many candidates provided vague and incomplete responses on conflict resolution techniques. Some still confused this topic with the problem-solving steps. Others linked the conflict the resolution techniques with the causes of conflict, as discussed in Q9.3.

(d)   Many candidates chose option 2 of Q9.5 since this option has been assessed many times in the past NSC examinations. Others provided vague and incomplete responses on dealing with difficult people in the workplace. Some strategies concentrated only on dealing with an aggressive person, while other responses were on negative strategies.

Suggestions for Improvement

(a)   Learners are expected to understand the sequential order of activities that take place at each stage of team development. Teachers are advised to also provide alternative words for norming, performing and adjourning as per the 2019 marking guideline. Learners must be taught how to differentiate between norming and performing stages, as they usually swop the answers for these stages. It should also be noted that team members must first complete their task before dissolving during the adjourning stage.

(b)   A clear distinction should be made between the meaning of a 'conflict' and a 'grievance'. This will enable learners to understand the differences between the conflict resolution steps and the grievance procedure. The former refers to two people, while the latter refers to one person. Hence the steps are not the same. Furthermore, the differences between the conflict resolution steps and the problem-solving steps are that conflict resolution is about people, while problem-solving is about solving a particular business problem.

(c)   Teachers are advised to teach option 1 and 2 of dealing with difficult people in the workplace. The first option focuses on dealing with difficult people, while the second one focuses on dealing with difficult personalities. Furthermore, businesses set deadlines and instructions on how difficult people and personalities should change their behaviour. Learners must be discouraged from writing negative statements on how to deal with difficult employees and personalities.

QUESTION 10: BUSINESS OPERATIONS: TOTAL QUALITY OF PERFORMANCE

The responses of candidates to this question ranged from fair to poor. Candidates were expected to perform better in this question, as three out of four subquestions were asked in the 2018 November NSC question paper. Many candidates did not choose this question. The topic on Total Quality Management/TQM still remains a challenge to many candidates, as stated above.

Common Errors and Misconceptions

(a)   Q10.2 was fairly answered by many candidates, even though some responses were incomplete.

(b)   Although candidates were able to explain the differences between 'quality control' and 'quality assurance' in Q10.3, they could only provide one fact instead of two for each concept. Candidates were expected to perform better in this question' as it has always been asked in past question papers.

(c)   The majority of candidates could not discuss the impact of TQM elements on a large business in Q10.4. They confused the impact of continuous skill development as a TQM element with the impact of the Skills Development Act on businesses. Many responses were based on customer satisfaction, increased sales and profitability, which were not correct.

(d)   Poor performance was noted in Q10.5 as the majority of candidates' responses were limited to two facts in this question. They could not suggest alternative ways in which TQM can reduce the cost of quality. Some confused this question with the quality indicators of the purchasing function. Others confused this question with the impact of TQM if poorly implemented by businesses.

Suggestions for Improvement

(a)　Learners must be encouraged to write full sentences on the benefits of a good quality management. This will enable them to earn good marks as this topic is better understood.

(b)　Practical examples should be given on the differences between 'quality control' and 'quality assurance'. They should be encouraged to provide a detailed analysis of each concept. It should be noted that quality assurance cannot be done before quality control, as the quality of machinery, employees and raw materials must first be checked before production takes place.

(c)　Teachers are advised to teach the impact of TQM elements on large businesses by answering the how part, e.g. how large businesses implement these TQM elements and what the disadvantages are of implementing these elements.

(d)　Furthermore, teaching and learning should only focus on TQM elements that are outlined in the 2020 examination guidelines with specific reference to large businesses. Refer to page 16 of the 2020 exam guidelines

(e)　Learners must know that the main reason why businesses implement TQM elements is to reduce the cost of quality. This is why this topic demands a detailed explanation. It must be noted that the point 'businesses work closely with suppliers in order to improve the quality of material' is applicable to both 'cost of reduction' and 'quality within purchasing function'. Teachers must ensure that the distinction is clearly explained in class discussions.

(f)　Content training on 'quality of performance' must be conducted in 2020 so that learners are adequately prepared for Paper 1. Teachers must encourage learners to study these topics and track their performance in formal and informal assessment tasks. This topic must be remediated to learners until they gain insight.

Chapter 5

ECONOMICS

The following report should be read in conjunction with the Economics question papers 1 and 2 of the November 2019 Examinations.

5.1   PERFORMANCE TRENDS (2015–2019)

The number of candidates who wrote the Economics examination in 2019 decreased by 7 229 candidates in comparison to the number in 2018. The 2019 performance reflected a decrease in comparison to performance in 2018 with 69,3% of candidates achieving at the 30% level and 39,9% achieving at the 40% level.

Table 5.1.1: Overall Achievement Rates in Economics

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
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
2019	107 940	74 796	69,3	43 054	39,9

Over the years there has been an improvement in the writing of essays, but the 8-mark higher-order questions and the drawing of graphs still present a challenge to learners. However, there are certain areas that require more attention for the results to improve in a meaningful and sustainable way.

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

It is imperative that the content of all topics is covered adequately and timeously to ensure sufficient opportunity for revision. When teachers fall behind in content coverage, topics under Economic Pursuits and/or Contemporary Economic Issues tend not to be taught thoroughly. Candidates who attempt questions on such topics perform poorly in comparison to other topics. Teachers should structure assignments, projects and case

studies in Grades 10 and 11 on the challenging topics of Grade 12, e.g. competition and collusion, 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 be supported by subject advisors.

In Grade 10 and Grade 11 learners' knowledge should be extended where possible on topics/content so that a strong foundation is set to cope with the demands of the Grade 12 curriculum. In Grade 10 topics such as the Circular Flow, Budget, Government Intervention, Business Cycles, Quantitative Elements and Grade 11 topics such as Calculation of GDP, Market Structures, Cost and Revenue Curves, Income Inequalities, Indicators, North/South Divide, Globalisation and Environmental Sustainability have strong links to the Grade 12 topics and should emphasised.

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 address graphs with learners by drawing the cost and revenue curves step by step. As each step is done it needs to be explained. After the teacher draws each step, learners should do likewise 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 from Grade 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 (Percentage)

	2015	2016	2017	2018	2019
■ % achieved at 30% and above	68.2	65.3	71.0	73.3	69.3
■ % achieved at 40% and above	39.1	36.4	42.7	44.8	39.9
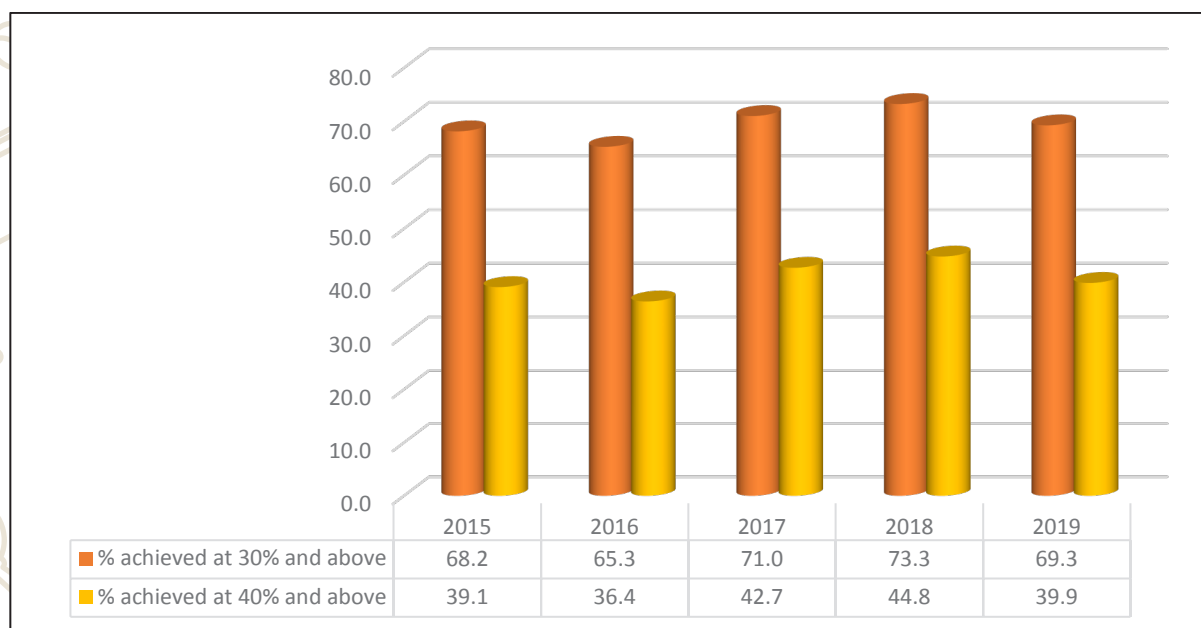
Graph 5.1.1: Performance Distribution Curves in Economics (Percentage)

	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
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
2019	0.8	8.6	21.3	29.4	20.2	11.0	5.4	2.4	0.8	0.2
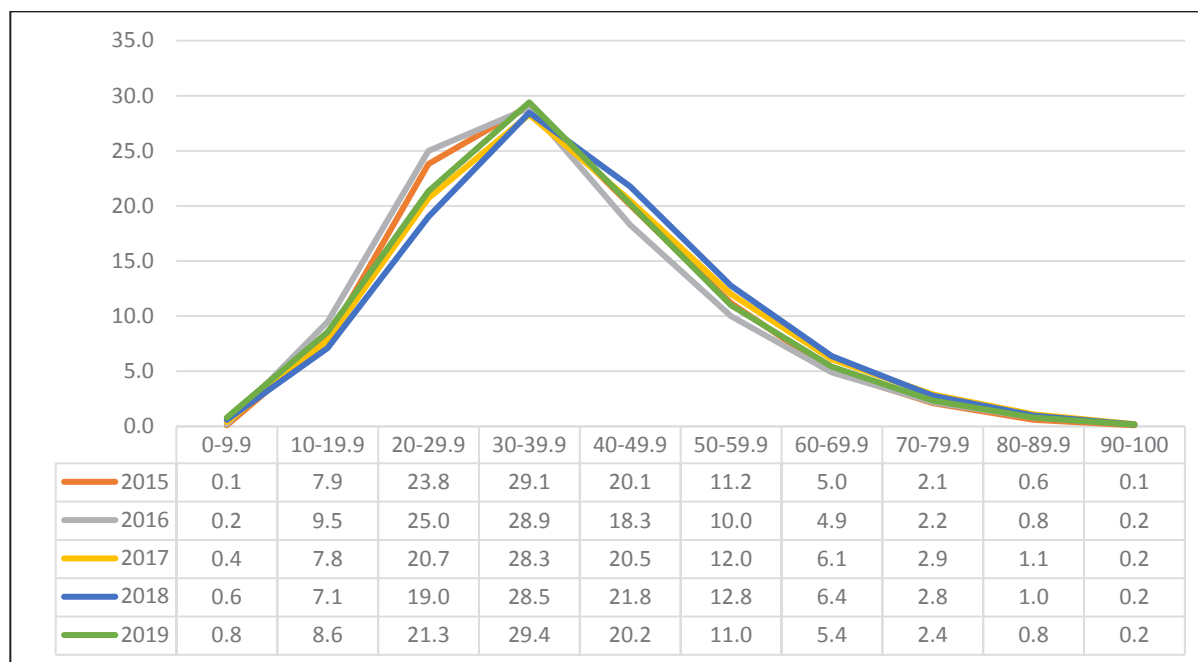
5.2   OVERVIEW OF LEARNER PERFORMANCE: PAPERS 1 AND 2

General Comments

(a)   A good understanding of tables, extracts, news articles, figures and graphs enabled many candidates to perform well. 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 understand questions and 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 issues. Graphs in Microeconomics always appear to be a challenge as questions relating to graphs are either avoided or answered poorly, e.g.:
  - Paper 1: Q2.3.4: Why is there a rise in household expenditure while unemployment is steadily increasing? Q4.3.5: How can countries benefit from international trade agreements?
  - Paper 2: Q5: With the aid of graphs, discuss how economic profit and economic loss is determined in a monopoly market. Q4.2.4: Why is the marginal revenue curve the same as the demand curve in a perfect market?

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- **Exposure to different types of questions:** Skilled learners are able 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 instruction 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, e.g.:
  - Paper 1: Q2.5: With reference to the Phillips curve, analyse the relationship between inflation and unemployment. Q4.5: How can monetary policy contribute to economic growth?
  - Paper 2: Q2.5: Evaluate the impact of imperfect competition on consumers. Q3.5: How can countries contribute to reducing ocean (sea) pollution?

- **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 2020 year-end examinations, all learners should use past papers for the final examinations (2016–2019) and supplementary examinations (2017–2020) 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 previous 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 papers and the marking guideline is good as a revision tool but not as a teaching tool. Interpretation of questions is critical. Content should be continually assessed in line with the *Examination Guidelines*.

(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 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 questions in 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, e.g.:

  - Paper 1 (related to foreign exchange markets): Q2.4: Use the graph to explain the impact of an increase in exports to China on the value of the rand.

  - Paper 2: Q4.4: With the aid of a graph explain the impact of minimum prices on the market.

Teachers should familiarise their learners with the new phrasing of questions, e.g. the *what*, *why* and *how* type of higher-order questions. However, there is a misconception that if a question begins with *How* then it constitutes a higher-order question.

Consider this question: *How many units are demanded at a price of R10?* This is a cognitive middle-order and easy question. 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. Further, it must be noted that answers to these questions are not necessarily found in textbooks but will require an application of content studied within a particular context. Reading the question again will ensure greater accuracy in the candidates' response. Responses need to be formulated and the question should be checked 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: In Q2.5 many candidates drew the Phillips curve, instead of analysing the relationship between inflation and unemployment with reference to the Phillips curve.

- Paper 2: In Q2.5 candidates had to evaluate the impact of imperfect competition on the consumers but instead they described the characteristics of imperfect competition and in some case the answer related to the impact on businesses.

(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 especially for higher-order questions, e.g.:

- Paper 1: Q6 Additional part: Evaluate the success of protectionism as a trade policy to protect industries against foreign competitors.

- Paper 2: Q4.5: How successful has South Africa been in using education to ensure environmental sustainability?

(e) **The importance of formative testing:** Teachers should build the confidence of learners through the use of short informal formative tests and tasks. These 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.

(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 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, 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. This is necessary where a textbook does not adequately cover aspects stipulated in the Examination Guideline.

5.3 DIAGNOSTIC QUESTION ANALYSIS FOR 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 Q1 was good. The performance in Q2, Q3, and Q6 showed a decline from that of 2018. Candidates performed the worst in Q3 (Economic Pursuits) question in 2018 and 2019. However, there was an improvement in Q5.

Graph 5.3.1: Average Marks per Question Expressed as a Percentage
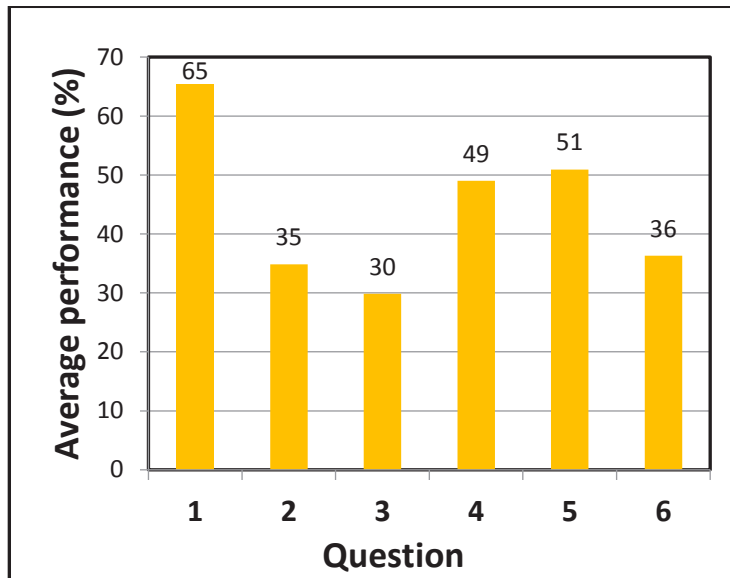
Q	Topic/Aspect
Q1	Objective Questions
Q2	Macroeconomics
Q3	Economics pursuits
Q4	Macro & pursuits
Q5	Macroeconomics
Q6	Economics pursuits

Graph 5.3.2: Average Marks per Subquestion Expressed as a Percentage
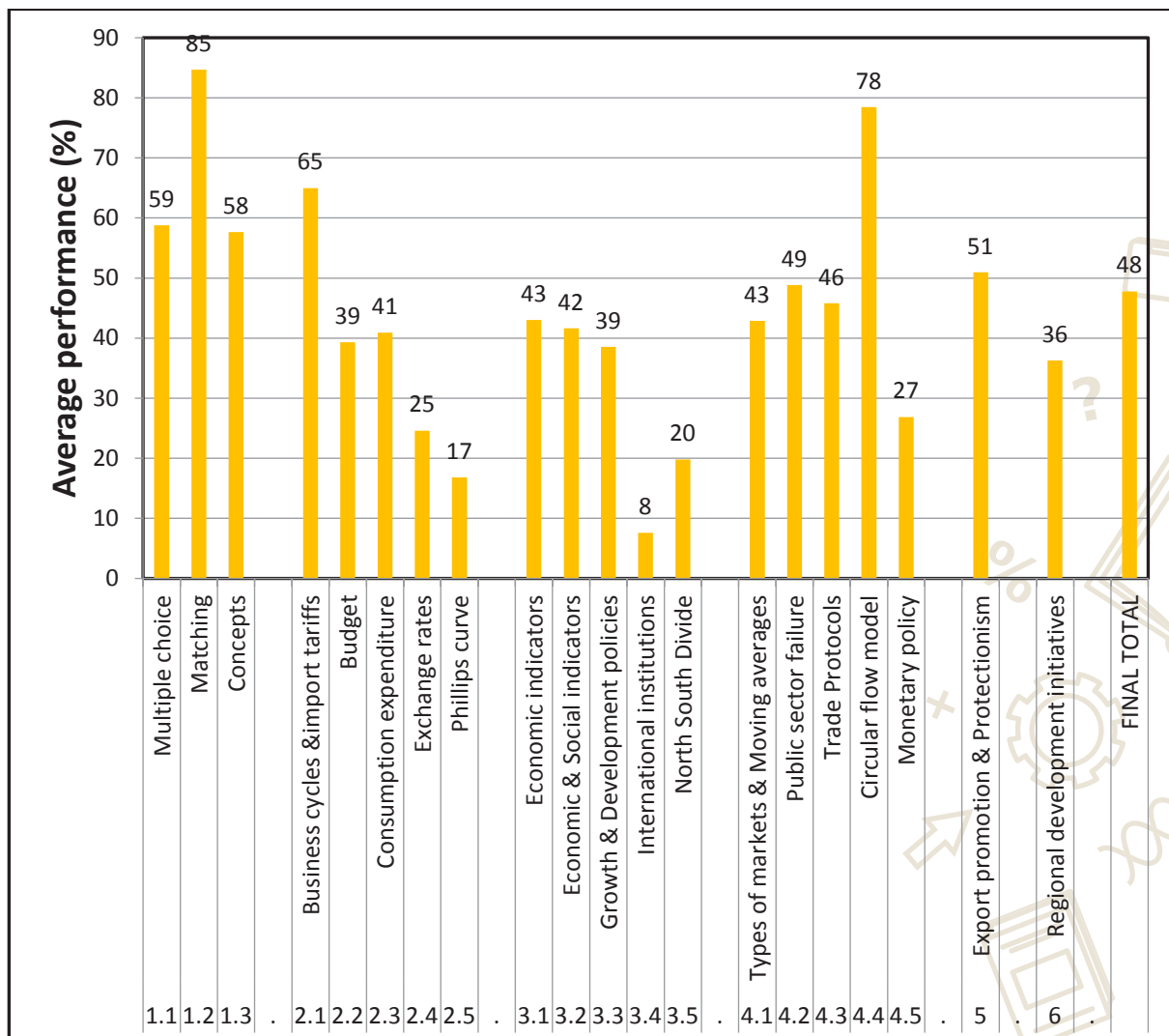
5.4 ANALYSIS OF LEARNER PERFORMANCE IN EACH QUESTION IN PAPER 1

QUESTION 1: MACROECONOMICS AND ECONOMIC PURSUITS

Most candidates performed well in Q1. The performance of candidates 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 Q1.1 candidates had to choose the answer from various options provided. Generally, the lack of content knowledge led to candidates being unable to choose the correct alternative. Poor performance was recorded in Q1.1.2 and Q1.1.8.

(b) 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 *Human Development Index* and *portfolio investment*. Poor performance was recorded for Q1.2.3 and Q1.2.5.

(c) In Q1.3 candidates had to give an Economics term for a given statement but they provided an abbreviation instead. The marking guidelines accepted only the correct answer with no abbreviations or examples. When candidates provided more than one answer, they were awarded no marks. Overall performance has improved compared to that of 2018.

(d) In Q1.3.2 candidates confused depression and trough, and Q1.3.6 was a good example of typical answers from candidates reflecting broad knowledge rather than in-depth knowledge of the subject matter.

Suggestions for Improvement

(a) 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 the light of this, learners 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 would facilitate the marking of scripts.

(b) 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.

(c) Teachers should expose learners to basic economic concepts through short formative tests on basic concepts. Learners 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.

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

(e)   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 types of business cycles in Q2.1.1 and wrote on different phases of business cycles and business cycle indicators instead. In Q2.1.2 candidates responded by focusing on the advantages of cheap imports instead.

(b)   Many candidates could not explain the relationship between the main budget and the MTEF in Q2.2.4.

(c)   Most candidates performed poorly in Q2.3.5 where they had to explain why there is a rise in household expenditure while unemployment is steadily increasing.

(d)   Candidates performed poorly in Q2.4 where they had to study the graph to explain the impact of increased exports to China on the value of the rand.

(e)   Candidates failed to visualise the Phillips curve to discuss the relationship between inflation and unemployment (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 by SARB (on national account aggregates and foreign exchange markets) and Stats SA, should be studied in detail to ensure that learners know exactly how to prepare themselves thoroughly for the final examination. Learners should be able to use the information provided to answer questions appropriately (see Q2.4 where the given figures could be used in reasoning). 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 learner's 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 into real-life economic situations, e.g. the reaction of the value of the South African rand to an increase in the exports to China.

(c)   Learners should be exposed to advanced paragraph-type questions (see Q2.5). They should be guided on how to visualise the Phillips curve and apply it to analyse the relationship between inflation and unemployment. The importance of detailed analysis of graphs and their influence on the foreign exchange market must be clearly explained during the teaching and learning process (see Q2.4). Small formative assessment tasks should be used to ascertain whether learners are able to apply their knowledge, place emphasis on their own opinions and understanding.

(d)   Learners should read questions carefully to determine what is expected of them. In Q2.5, for example, candidates should only have referred to the curve to answer 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.

(b)   Candidates found opinion-based questions challenging. They could not name the economic indicators related to price changes in Q3.1.1. 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.

(c)   In Q3.2.5 weaker candidates could not explain the impact of a shortage of trained workers on global trade and failed to associate content learnt and its contextualisation. This indicated a lack of general knowledge and interpretation skills, which was also evident in Q3.2.5, Q3.3.4 and Q3.3.5.

(d)   It would appear 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 explain the role of international institutions in the standardisation of a country's indicators in enough detail.

(e)   In Q3.5 candidates were unable to address the unequal standards of living related to the North-South divide in enough detail to earn marks; instead they gave generic information.

Suggestions for Improvement

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

(b)   Formative tests should be used to ensure that learners are able to understand and define what is meant by *constant prices, North-South divide* and *globalisation*.

(c)   Additional learning material should be given to learners during the academic year. Data provided in data-response questions should be read thoroughly before learners 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 and Q3.3.1.

(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 enable 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 Q4.1.2 where they had to explain why it is important to use moving averages to forecast business cycles. Some candidates gave generic information and could not apply their knowledge on why moving averages are used in forecasting of business cycles.

(b)   In Q4.2.4 many candidates could not determine why public sector failure would lead to economic instability and they mentioned other consequences of public sector failure.

(c)   Most candidates could not answer the database question (Q4.3.4) correctly. Interpretation of such content seemed to be a major stumbling block for candidates. They appeared to lack insight into current economic affairs and battled to respond to questions on issues concerning everyday life (see Q4.3.4 and Q4.3.5).

(d)   In Q4.5 most candidates struggled to apply their knowledge on how the monetary policy contributes to economic growth. They focused mainly on economic growth, but their answers lacked context.

Suggestions for Improvement

(a)   Teachers should use a variety of resource materials to prepare learners adequately for the examination. 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 an instruction 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

Many candidates listed facts in broad terms. The additional part of the essay, where candidates had to evaluate the success of protectionism as a trade policy to protect industries against foreign competitors, 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 *Examination Guidelines* for 2017 which clearly indicate all possible essay questions for the next 3 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 question. 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 South African endeavours (initiatives) in regional development in broad terms.

(b) The additional part, which demanded higher cognitive thinking skills, was poorly answered by most candidates who referred only to the advantages of industrial development in South Africa.

Suggestions for Improvement

(a) Teaching of these topics should be done holistically. Learners should be guided in discussing 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. Learners need to improve their evaluation skills and 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 discuss these regularly in class.

5.5 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.

Most candidates performed satisfactorily 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.

The performance in Section A dropped by 10% when compared to 2018 with a significant decline in Q1.1. In Section B, candidates generally performed poorly in Q2 and Q4 while an improvement was noted in Q3. In Section C, Q5 which was based of graphs was the worst performing question with a 30% average. Question 6, which was based on Contemporary Economic Issues, showed a slight decrease in performance.

Graph 5.5.1: Average Marks per Question Expressed as a Percentage
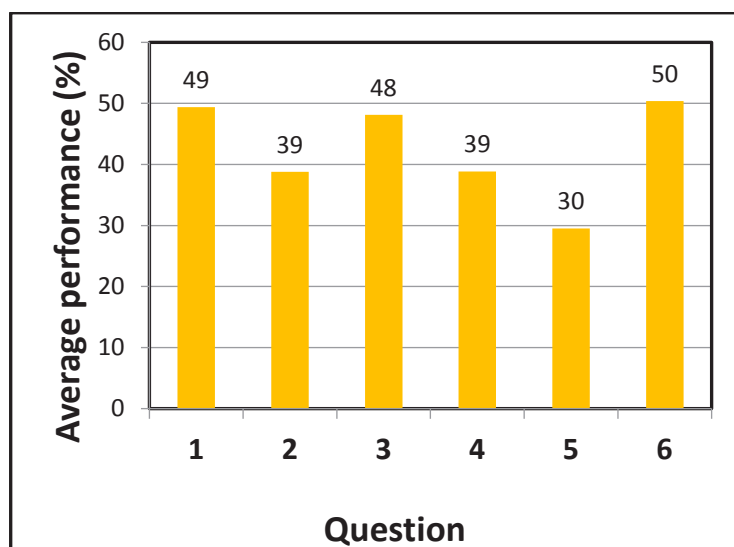
Q	Topic
Q1	Objective Questions
Q2	Micro-economics
Q3	Micro-economics & Contemporary economic issues
Q4	Macro & pursuits
Q5	Micro-economics
Q6	Contemporary economic issues

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Graph 5.5.2: Average Marks per Subquestion Expressed as a Percentage

Bar chart — Average performance (%) per subquestion:

Subquestion	Topic	Average performance (%)
1.1	Multiple choice	39
1.2	Matching	77
1.3	Concepts	41
2.1	Production costs	47
2.2	Negative externality	33
2.3	Competition policy	53
2.4	inefficiencies	31
2.5	imperfect competition	33
3.1	Tourism/Inflation	29
3.2	Tourism	64
3.3	Environmental Problems	47
3.4	Benefits of tourism	46
3.5	Pollution	42
4.1	Pub;ic goods & Inflation	33
4.2	Perfect market equilibrium	27
4.3	Indigenous knowledge systems	59
4.4	Minimum prices	45
4.5	Environmental sustainability	26
5	Monopolies	30
6	Cost push inflation	50
	FINAL TOTAL	50

5.6 ANALYSIS OF LEARNER PERFORMANCE IN EACH QUESTION IN PAPER 2

QUESTION 1: MICROECONOMICS & CONTEMPORARY ECONOMIC ISSUES

Common Errors and Misconceptions

(a)   This section was generally well answered. Economic concepts were properly understood by most candidates as they managed to obtain maximum marks. This shows a great improvement in understanding the concepts included in Q1.3 which were generally poorly done 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 on questions related to microeconomics. In Q1.1.3 candidates performed poorly due to the question relating to an oligopoly market. The supply curve is not covered explicitly in the content but rather the demand curve. International agreements that deal with major environmental problems are confusing to candidates in Q1.1.6. Other options besides B (Stockholm Protocol) were given as an answer. In Q1.1.7 candidates confused the environmental world heritage sites with world heritage sites.

(d)   Many candidates confused break-even point/normal profit with equilibrium in Q1.3.1. In some cases zero economic profit was given as an answer which was not accepted as this is not correct terminology.

(e)   In Q1.3.5 a clear misunderstanding of the kinds/types of inflation was displayed by the candidates' responses. In Q1.3.6 permits were confused with marketable permits.

Suggestions for Improvement

(a)   In Q1.1 learners should write down only the letter of their choice (A, B, C or D) 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. Learners 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 they 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)   Teachers must emphasise that equilibrium is not a synonym for break-even which relates to total costs being equal to total revenue. Equilibrium refers to two variables being equal and is generic. Equilibrium point in determining profit/loss where MR=MC can result in economic profit and economic loss. The acceptance of alternate answers must hold true in all circumstances.

(c)   Definitions and concepts should be emphasised. Use of a glossary should form the basis of teaching and learning in Economics.

(d)   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 Microeconomics.

QUESTION 2: MICROECONOMICS

Common Errors and Misconceptions

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

(b)   In Q2.1 candidates gave examples of demerit goods instead of negative externality. Alcohol and drugs were common responses.

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(c)   Candidates mentioned only the cost to the society in Q2.2.3 and omitted private costs as a description of Social Costs.

(d)   In Q2.2.5 candidates' responses showed a lack of understanding of the 'socially optimal'. This question could have been answered despite the labelling of quantities having been omitted. This compromised some of the responses.

(e)   In Q2.3 candidates demonstrated a lack of knowledge of the differences between the Competition Act and the three institutions responsible for carrying out the Competition Act. Although they knew the institutions, they seemed to confuse their roles and how they are linked to the Act. In Q2.3.4 candidates failed to link SMMEs to the goals of the Competition policy.

(f)   The most common response given to Q2.5 was 'the exploitation of consumers' whereas the rest of the answer was irrelevant and incorrect. Candidates struggled to evaluate the impact of imperfect competition on consumers. Instead they focused on the characteristics of imperfect competition.

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 them to different examples.

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

(c)   Teachers should focus consistently on the content and graphs in microeconomics from Grade 10 to 12 to reinforce the various concepts covered.

(d)   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.

(e)   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 candidates could not explain why core inflation is lower than headline inflation. Instead they gave a description of core inflation or just referred to one type without mentioning why the former is different from the latter.

(b) In Q3.2 some candidates were confused by the bar graph. They interpreted the figure 4.1 % in 2017 as a percentage change as a reference to 2016 which was not indicated. The figure of 10.3 % in 2018 for Middle East was interpreted as a percentage change from 2017 figure of 4.1%. This is not correct as the 4.1% change in 2017 would mean that the 2016 figures for Middle East would have been either 0% or 8.2%. The graph shows that of all international tourist arrivals in 2017, 4.1% were from the Middle East. This increased to 10.3% in 2018. Thus the percentage was 6.2%. Although there was some concern in the interpretation and presentation of data, candidates performed very well in the question.

(c) Candidates' responses in Q3.3.3 focused on the loss of biodiversity instead of biodiversity. In Q3.3.4 candidates seemed to lack knowledge of the purpose of CITES. Answers such as the creation of job opportunities and promotion of tourism were given. Some responses focused more on preservation and conservation or explanation of biodiversity loss. Candidates answered Q3.3.5 poorly as many confused subsidies with taxes and fines. It does seem candidates only know punitive measures for reducing environmental damage.

(d) Limited critical thinking skills of candidates resulted in Q3.5 being poorly answered. Responses given were dumbfounding. There is a sense that some candidates did not understand what an ocean is because answers included putting a fence around the sea to reduce pollution and replacing the water in the ocean.

Suggestions for Improvement

(a) The teaching of contemporary economic issues is imperative and basic concepts need to be emphasised. Sometimes these topics are not covered in class due to poor time management. Teachers should cover Environmental Sustainability thoroughly in Grade 11 as a large part of the content overlaps with the Grade 12 topic on the environment. Assessment should also be comprehensive to give learners a head-start in Grade 12. This will allow for more time to cover other topics which are sometimes neglected.

(b) The presentation of data in Q3.2 is correct and is in line with the standard presentation and interpretation of similar data published by financial institutions. Refer to the Reserve Bank Quarterly bulletin which has many examples of how percentage changes are presented, e.g. changes to inflation rate. This will eliminate the misconception alluded to above. Note that the bar graph could be represented as a line graph. The interpretation of this type of data must be emphasised to avoid confusion.

(c) 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 using 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.

(d) In teaching Economics, a crucial element is to motivate learners to think laterally about the topic. Where possible teachers must relate the different topics to the real world to help learners prepare for higher-order questions. Learners must gain practice in evaluating, assessing or critiquing issues or topics whenever possible. Teachers are encouraged to set their own higher-order questions and not only rely on past question papers as the only possibilities. It is a misconception to expect all answers to come from textbooks.

QUESTION 4: MICROECONOMIC/CONTEMPORARY ECONOMIC ISSUES

Common Errors and Misconceptions

(a)　In Q4.1.1 candidates provided examples of public goods rather than characteristics. The responses in Q4.1.2 were poor as many candidates are not aware of the positive side of inflation.

(b)　Responses to Q4.2.4 related to the description of marginal revenue instead of linking it to the demand curve of a perfect market. The application of the concepts in a context, e.g. why the curves are the same, proved challenging for candidates.

(c)　There is a misconception that answer to 1-mark questions in the Data Response item must come directly from the data. A question may require an application of knowledge when the answer appears in the data or it may be a simple question related to the data. Q4.3.2 would be simple if the topic was covered adequately in class.

(d)　A common misconception in Q4.4 was the interpretation of minimum as being the lowest price, hence the indication of minimum price below equilibrium. Some candidates merely copied the graph from Q2.2. Apart from failing to draw the correct graph, their labelling was also incorrectly done. Many included cost curves which were also incorrectly labelled. In most cases only one graph was drawn, usually for the individual firm. Some candidates 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.

(e)　In Q4.5 many responses were related to measures for ensuring environmental sustainability, instead of evaluating the success of the one measure that was given which was *Education.*

Suggestions for Improvement

(a)　Teachers must discuss concepts thoroughly by providing examples where possible. This will improve the learners' understanding of the topic. Concepts should be related to the real world for learners to appreciate and understand the topic, e.g. in teaching the concept, 'conservation', a link must be drawn to how this done in the real world, and particularly in South Africa.

(b)　A clear distinction between minimum and maximum prices should be made through description and graphical representation.

(c)　Emphasise the importance of labelling all axes, cost curves and revenue curves, supply and demand curves and showing changes on the axes when a relationship has to be indicated.

(d)   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 Microeconomics.

(e)   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: MICROECONOMICS

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)   Candidates did not draw and label cost and revenue curves correctly. Where the curves were correct, the identification of profit maximising point or loss minimising point was incorrect. This impacted negatively on the explanation of graphs.

(b)   In many cases candidates focused of the characteristics of monopolies as opposed to the explanation of the graphs.

(c)   Some responses included cost and revenue curves of both perfect and monopoly market on the same set of axes which suggested confusion in understanding graphs.

(d)   In the additional part many candidates struggled to link the performance of natural monopolies to achieving economic profit. A context such as 'Eskom as a natural monopoly', which was not given, made the question more challenging for the learner.

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

Suggestions for Improvement

(a)   Teachers are encouraged to require learners to practise the drawing of graphs and to assess their own accuracy in labelling of curves. This must be done on a regular basis until it is mastered.

(b)   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.

(c)   Teachers should ensure that learners draw graphs of equilibrium positions while this is illustrated on the chalkboard/whiteboard. Teaching graphs via a power point is discouraged but should rather be a support to the actual drawing of graphs. The following method is suggested.

- Start by drawing the Revenue curves (D, AR, MR)
- Then draw the AC curve followed by the MC curve. The AC curve should be drawn before the MC (smile and tick). This would make it easier for the learner to ensure that the MC cuts the AC at its minimum point.

(d)   Teachers must be aware that in the drawing of graphs for *economic profit* for an imperfect market, the profit maximizing point can lie above, on or below the AC curve. The position of the profit maximizing in relation to the AC curve does not matter. The explanation should follow the basic rules outlined below. The method can be used for any equilibrium position.

(e)   The explanation of the graph should follow the following basic steps irrespective of which market structure is involved.
- Identify profit maximizing point (MR=MC) first. This is most important as it impacts on all other variables in the explanation.
- The price and quantity should be determined. Note that in an imperfect market a line must be extended upwards from profit maximizing point to the demand curve to read off the price.
- The next step is to compare AR (price) to AC to determine whether economic profit, economic loss or normal profit is made.
- Indicate the total economic profit from the graph. This could take the form of labels or a calculation.
- The equilibrium position could then be classified as a short term, long term or both.

(f)   Subject advisers/cluster leaders must provide adequate support and materials that would help teachers to deal with challenging topics such as graphs.

(g)   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)   The main part was answered fairly. Candidates understood that cost-push inflation is caused by factors that increase cost of production.

(b)   In the main part, candidates did not present their answers in terms of the structure expected by using subheadings.

(c)   Many candidates mentioned the correct causes of cost-push inflation but struggled to explain the cause adequately.

(d)   It can be inferred from the candidates' responses that they do not know the concept 'administered prices' and therefore struggled with evaluating the negative impact it has on the economy.

Suggestions for Improvement

(a)   All content should be completed timeously so that there are opportunities 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 their conclusions, learners should be taught how to structure a response in support of or against the facts mentioned in the main part. Teachers should remind learners of the guideline in the question paper regarding conclusions to the essays.

(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 2019 Examinations.

6.1   PERFORMANCE TRENDS (2015–2019)

The number of candidates increased by 2 186 relative to the 2019 enrolment. The general performance of candidates improved tremendously this year, as indicated by 80,5% of candidates achieving 30% and above, with 53,3% achieving 40% and above. The pass rate at both these levels is the highest recorded in the past 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
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
2019	271 807	218 821	80,5	144 755	53,3

Graph 6.1.1   Overall Achievement in Geography (Percentage)

	2015	2016	2017	2018	2019
■ % achieved at 30% and above	77.0	76.5	76.9	74.2	80.5
■ % achieved at 40% and above	50.4	48.1	50.1	46.7	53.3
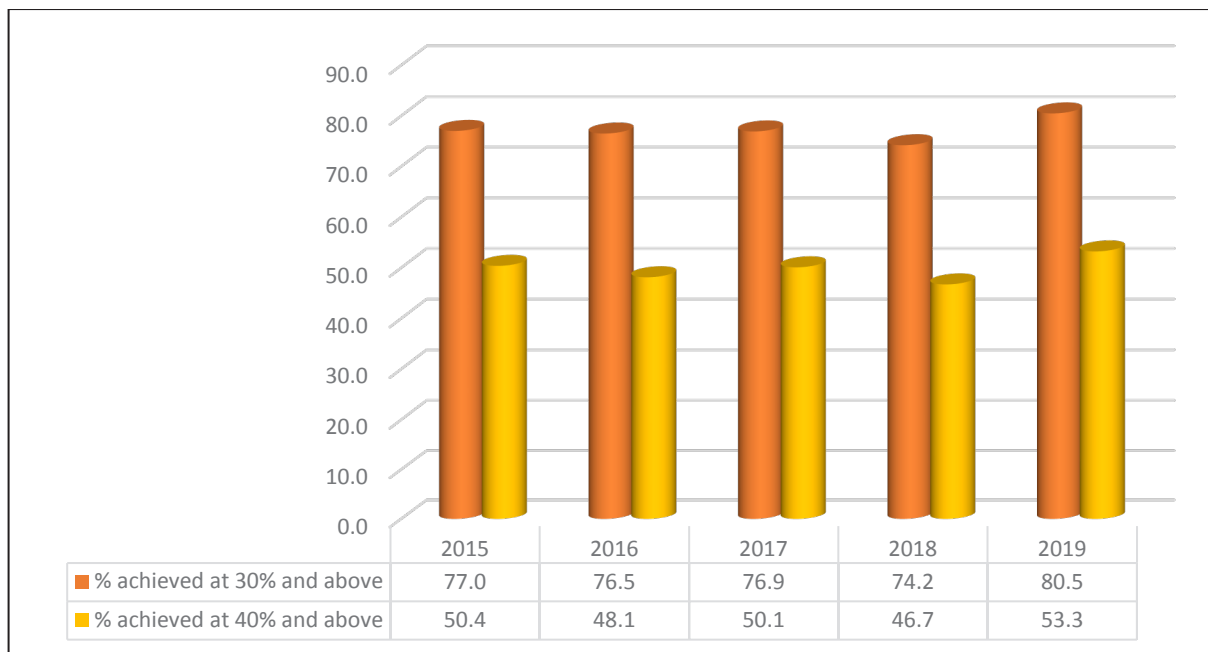
Graph 6.1.2   Performance Distribution Curves in Geography (Percentage)

	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
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
2019	0.2	4.4	15.0	27.2	24.5	16.0	8.3	3.5	0.9	0.1
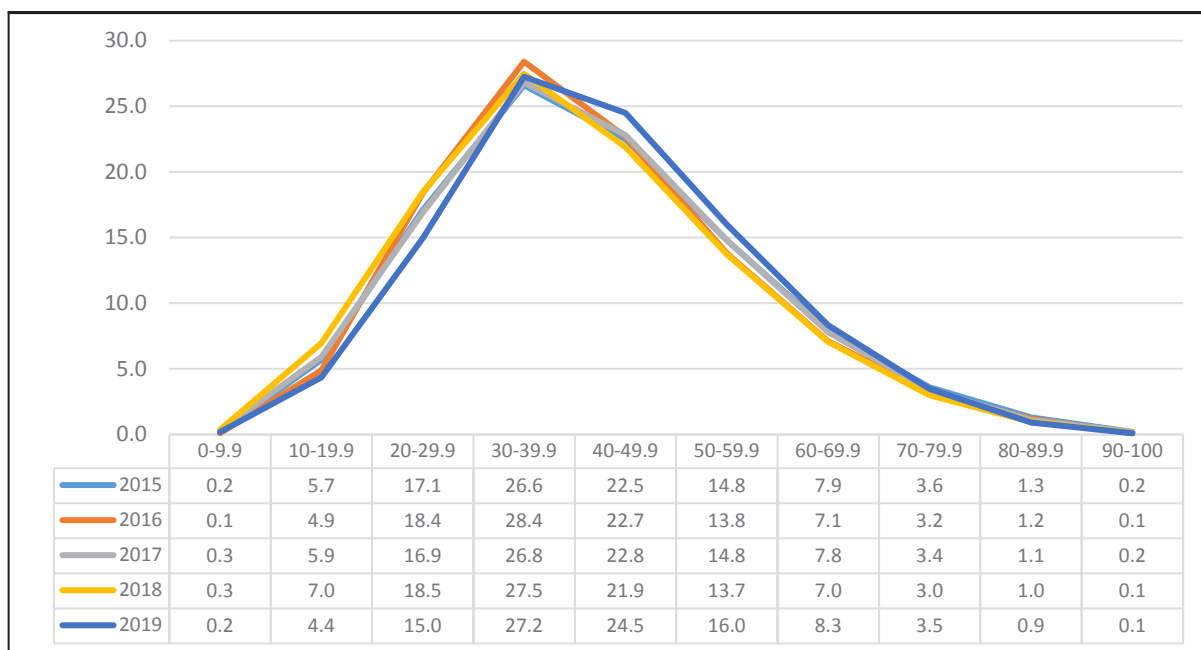
6.2 OVERVIEW OF LEARNER PERFORMANCE IN PAPER 1

General Comments

Similar areas of concern were raised in the diagnostic report of 2018. As these remain areas of concern in the context of the 2019 NSC paper, they are emphasised here once again.

(a) There were enough lower-order questions to give all candidates a fair chance to pass. Most of these questions are found in the short objective questions at the start of each question.

(b) In general, there was a tremendous improvement in the number of good performances. There were a number of quality responses to the question paper where good levels of understanding of geographical processes were evident. However, there were still a number of candidates who struggled to answer some of the questions set, even at the lower order.

(c) Many candidates are still not aligning their responses according to the demand of the action/command words used in the question. Words such as 'differentiate', 'distinguish between', 'discuss', 'suggest' and 'account for' require different types of response. Candidates often simply 'list' or 'name' an item when a discussion is required.

(d) **Short objective questions:** Candidates generally performed well in these questions. A variety of short objective-type questions were used, e.g. multiple-choice questions, matching columns, choose one term from the list provided and matching the statements below with one of the economic sectors or type of Settlement A and B.

(e) **Two- to four-mark questions:** These data response-type questions were often poorly answered where a discussion with more detailed reference was required. Candidates were, in many cases, 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, impacts and solutions when responding to these questions. Many candidates were unable to demonstrate an understanding of command/action words like 'evaluate', 'suggest' and 'account for'.

(f) **Paragraph-style questions:** (8 marks) These were middle- to higher-order questions. In particular, Q2.6.5 on the impact of levees and Q3.4.4 on the causes of urban problems were not answered well. It is evident that candidates were not taught the necessary skills to interpret and answer these types of questions. The candidates' paragraphs were often very long and the correct content was found only in the last few lines. There was often very little evidence of planning of the points to be made in the paragraph. Some candidates did not always heed the command words used in these questions.

(g) Most candidates do not have a sound knowledge of the basic geographic concepts and therefore would not be able to answer questions of a high cognitive demand. Some examples are the 'South African berg wind' (Q1.4.3; 8 marks), 'river capture' (Q1.5.5 & Q1.5.6; 6 marks), 'rural and urban climates' (Q2.4.3; 2 marks), 'river profiles' (Q2.5.5; 4 marks), 'fluvial landforms' (Q2.6.5; 8 marks), 'land reform policy' (Q3.3.2; 4 marks), 'Richards Bay SDI' (Q3.6.5; 4 marks) and the 'PE-Uitenhage Industrial Region' (Q4.5.6; 4 marks).

(h) Most of the major topics mentioned in the *CAPS* were tested with the exception of examples of primary activities, such as farming and mining.

General Suggestions for Improvement

(a) Candidates continue to struggle with action words that demand a higher cognitive level. 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. Specific action words that were deemed difficult in this examination were 'account for' and 'differentiate between'. Teachers are strongly encouraged to share the list below with learners from Grade 10.

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 some interpretation techniques. Learners cannot therefore merely reproduce knowledge gained in the classroom. Responses should be extracted from the source material given, as well as learners' own theoretical knowledge.

(c) Learners should be taught the skill of paragraph writing. These questions usually require a degree of critical and analytical thinking, which place them on a higher level of cognitive demand. Learners are expected to answer six paragraph questions in the examination paper as there are two paragraph subquestions in each question. The response to these questions should be presented in full sentences; it should be to the point and should focus on the intent of the question. Learners should try to limit their answers to the prescribed eight lines. This is to avoid long-winded answers and the wasting of valuable time.

(d) When planning a paragraph-type response, learners should underline or highlight the main topic of the question, the action word and the focus areas of the question. It has been noted that candidates do not adhere to the action word and often tend to list or mention only. Good practice when writing paragraph responses would be to make at least four points and then elaborate on each point. Some of the paragraph questions contain two components or issues (Q2.6.5) that must be addressed or referred to, and this should be done in equal parts. Learners should be able to provide and discuss at least two points for each of the two issues. This will assist them in not repeating facts. Poor punctuation and sentence structure make it difficult for markers to assess these questions effectively. Regular practice of paragraph writing in short informal and formal tests, as well as in internal examinations, will allow learners to improve their skills and confidence when attempting these questions. Bullet points are not an acceptable method of answering a paragraph question and could result in the learner not being awarded any marks.

(e) Teachers must ensure that learners know all the geographical concepts and definitions required. Learners should compile a glossary of terms in their notebooks for easy reference. This will assist them in describing and defining these concepts and definitions and in extending their geographical vocabulary. These definitions are often asked as the introductory question on a particular topic (Q1.5.1; Q2.5.1; Q3.3.1; Q3.5.1; Q4.4.1 and Q4.6.1) and carry 1 mark each. As these are seen as concepts, they do not have to be explained verbatim.

(f) When a geographical problem is studied, learners should study the causes and effects, both negative and positive impacts, as well as possible solutions or sustainable strategies to be implemented. As in-depth knowledge of such issues is essential, this might well involve informal research on the part of the teacher. There are many reliable Geographical sites to visit that will provide up-to-date and valid information.

(g) Geography is a dynamic subject and new information on numerous topics is updated regularly. The urban and economic environment is constantly changing. Teachers are therefore encouraged to collect resources on an ongoing basis and to be aware of current events that should be 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 set the right example by staying abreast of new developments in their subject.

(h) Teachers are encouraged to set source-based questions in class assignments, tests and examinations. They should use relevant and recent resources from the internet and avoid using sources that appear only in textbooks and are familiar to learners. Teachers should focus on the interpretation of diagrams, sketches, photographs, cartoons and graphical data. 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. Cartoons remain difficult to interpret by learners; however, the more practice they get, the more confident they will feel about answering a question based on a cartoon.

An infographic is another source that has been used as a stimulus for a question (Q4.5). It is a visual representation of information or data, e.g. as a chart or diagram, and contains both written information and a sketch or map. Texts are also used particularly in Q3 and Q4, and they contain valuable information to guide learners to appropriate answers. Learners could be asked to quote directly from the text, which then needs to be verbatim and not paraphrased.

An example of an infographic is provided below.
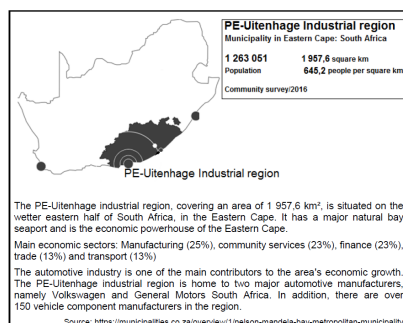
FIGURE 1: Q4.5: NSC November 2019 Paper 1

(i)   Teachers should become proficient in utilising diagrams by changing them to suit the questions they have set. The Paint app can be used to erase labels, add in extra content and combine more than one diagram to meet the needs of the questions set. The internet has Google images that teachers can download on specific topics in addition to the considerable printed media items available.

(j)   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 2020, the following core industrial areas will be studied once again: PWV/Gauteng and Port Elizabeth-Uitenhage/Nelson Mandela Metropole. For 2020, the Saldanha Bay IDZ and case studies of the Platinum SDI and the Richards Bay SDI must be studied.

(k)   As most prescribed textbooks do not contain the subject content mentioned above, teachers should do research on these topics themselves. Not all topics mentioned in the *CAPS* and Examination Guidelines are dealt with in-depth in the various prescribed textbooks. Teachers should therefore consult more than one textbook, if possible. Information provided in the various textbooks might not always be geographically sound and, when in doubt, research should be done on the topic.

(l)   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 and examinations. The format of each examination paper is also clearly spelt out.

(m)   To improve learner performance, teachers must refer to previous examination papers as a guide to ensure that the standard of questions used in 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 that address more advanced thinking skills. Previous question papers must not, however, be used as a tool for predicting future papers.

(n)   Teachers must ensure that the distribution of marks in the internal assessment tasks is also according to the requirements in the *CAPS* document. Blooms Taxonomy, or a similar tool, should always be supplied for formal tests, examinations and tasks. The weighting is 25% lower-order, 50% middle-order and 25% higher-order questions. If too many lower-order questions are asked in the internal assessment conducted at school, learners will not be exposed to questions testing a higher cognitive demand as asked in the final NSC examinations. This will give learners false notions of the level of performance required.

(o)   Learners should always provide units of measurement when giving answers about temperature (°C), wind speed (Q1.3.3; km/hr or knots), cloud cover (Q2.3.5; 2/8 cloud cover), atmospheric pressure (hPa) and direction of movement (eastwards).

(p)   Teachers must note that the short 15-mark questions at the beginning of each of the four questions are not necessarily going to test lower-order thinking skills and straight-forward recall only. Some questions might involve a higher level of cognitive ability. Note that the type of short question set is replicated in Q1 and Q2 and then in Q3 and Q4 to ensure that there is a good balance of cognitive demand in the question paper. Learners must read instructions carefully before answering the objective questions. The relevant letter is often required next to the question number, e.g. in Q4.1 candidates wrote 'rural' and 'urban' instead of A and B as instructed.

(q)   In addition to utilising previous examination papers and SABC revision programmes to explain and revise important geographical concepts, other useful tools include YouTube live feeds, *Xtremepapers. com*, *Mind the Gap*, *Telematics*, *Radio Sonder Grense* revision programme and *Teletutor*.

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 Performances per Question as a Percentage in Paper 1
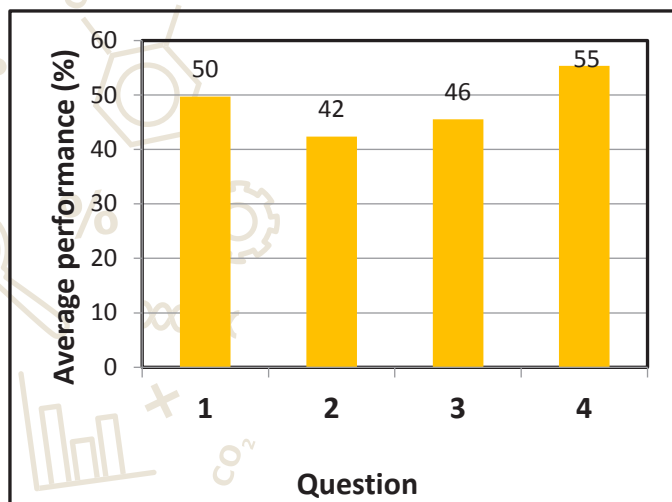
Q1	Climate and Weather and Geomorphology
Q2	Climate and Weather and Geomorphology
Q3	Rural and Urban settlements, and Economic Activities of South Africa
Q4	Rural and Urban settlements, and Economic Activities of South Africa

Graph 6.3.2 Average Marks per Subquestion as a Percentage in Paper 1
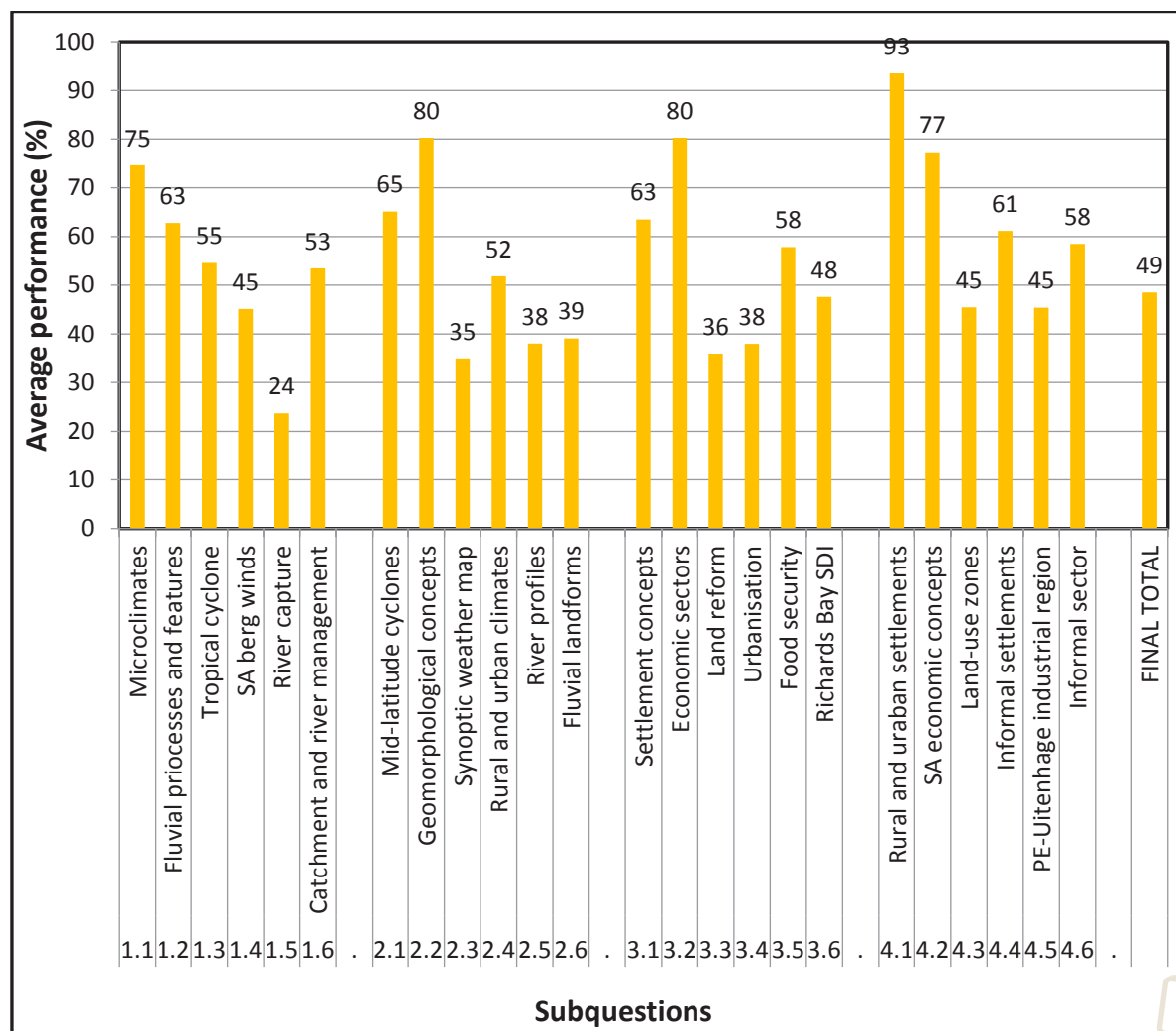
6.4 ANALYSIS OF LEARNER PERFORMANCE IN EACH QUESTION IN PAPER 1

QUESTION 1: CLIMATE AND WEATHER, AND GEOMORPHOLOGY

Common Errors and Misconceptions

(a)   In Q1.3.2 (1 mark) the question referred to conditions necessary for the development of a tropical cyclone. Candidates did not get credited if they said that the average sea surface temperature must be 26 °C. This is not correct, despite being documented as such in various textbooks.

(b)   Q1.3.5 (2 marks), which referred to how the dangerous semicircle of tropical cyclone, Idai, originated, was not within the reach of most candidates. While the *CAPS* document and Examination Guidelines discuss the characteristics of the dangerous semicircle, it does not cover how it originates or develops.

(c)   Q1.4.3 (4 marks) on the South African berg wind was not well answered, as candidates could not explain why the berg winds are dry and what causes them to be warm. Instead of giving the characteristics of the wind, as is often asked, the questions asked why it is a warm and dry wind. This increased the level of difficulty for the candidate.

(d)   Candidates could not explain in Q1.5.5 (2 marks) how the process of river capture caused the water-shed to change its position. Simply put, the question asked the candidate to explain the process of abstraction. Many candidates could name the process, but could not explain it.

Suggestions for Improvement

(a)   For tropical cyclones, like Idai, to develop, the surface ocean temperature needs to be very warm. Temperatures exceeding 26,5 °C are required. This actually has to be to a depth of approximately 60 m. Tropical cyclones are also not found between 5°N and S of the equator, as there is no Coriolis force active close to the equator.

(b)   The dangerous semicircle referred to in Q1.3.5 has the following characteristics: The most intense part of the storm with greatest wind speeds is due to the isobars being very close together. It lies to the side of a tropical cyclone and to the left of the direction of movement of the storm in the Southern Hemisphere where the winds are stronger. This is because the cyclone's translation speed (forward movement) and rotational clockwise circulation are added together. This dangerous semicircle is also referred to as the front left (SW) quadrant in some textbooks.

(c)   Berg winds become hot dry winds due to the fact that they originate over the interior plateau and diverge out of the Kalahari HP cell and move down the escarpment towards the coastal LP cell. As the air mass moves down the escarpment, it heats up according to the dry adiabatic lapse rate of 1 °C for every 100 m. This heating results in any remaining moisture evaporating, resulting in a warm and dry air mass reaching the coastal LP. As the air mass moves towards the LP system, it compresses, which increases the temperature.

(d)   The process of abstraction refers to the movement of the watershed by a more energetic river in the direction of a less energetic river. This results in headward erosion both lowering the watershed vertically and moving it backwards horizontally in the direction of the less energetic river. This can be seen in the diagram below. The more energetic river is B and the watershed is moving in the direction of river A. The watershed moves from position 1 to position 2.

Abstraction of a watershed

• A watershed remains in the same position only if the rates of erosion on either side are equal.

• The river (B) flowing down the steeper gradient erodes faster and moves the watershed back from position 1 and 2.

• Water flowing over the area between 1 and 2 will this no longer flow down the gentle gradient as river A, as it has previously done, but will be captured and become part of the catmint area of river B.

[Source: https://www.slideshare.net/jlanser/river-profiles]

QUESTION 2: CLIMATE AND WEATHER, AND GEOMORPHOLOGY

Common Errors and Misconceptions

(a)   Candidates could not give the general movement of a Coastal LP system in Q2.3.3 (1 mark).

(b)   In Q2.4.3 (2 marks) candidates referred to pollution in general as the cause for more frequent rainfall at B rather than A.

(c)   In Q2.4.4 (2 marks) candidates struggled to explain how the geometric shape of the buildings in the city caused a greater absorption of heat.

(d)   With regard to Q2.5.5 (4 marks), candidates could not differentiate between the grade of the original and new longitudinal profiles depicted in Figure 2.5. This required the candidate to not only know the different types of grade, but also to be able to identify this on various resources like the two profiles shown in Figure 2.5.

(e)   Q2.6.4 (2 marks) and Q2.6.5 (8 marks) proved to be problematic to many candidates. It would seem that many candidates knew what a levee was, but many could not explain why it formed in the lower course or what impact it had on the farming on the adjacent floodplain.

Suggestions for Improvement

(a)   A coastal LP system originates along the West Coast of South Africa and moves along the coast to the East Coast, as seen in the diagram below.

[Source: *Study and Master Grade 12 Textbook*]

(b)   In Q2.4.3 the required answer was hygroscopic nuclei or condensation nuclei which allows water vapour to condense around them, which results in the formation of clouds. Solid pollution particles, like dust, soot or salts are examples of hygroscopic nuclei.

(c)   The word 'geometric', which was used in Q2.4.4, related to the characteristic shape of a building. Most buildings have a geometric shape as they have a height in metres and a width in metres, which indicates that there is a greater surface area (L x B) for the absorption of heat.

Width of Building (m)

Height of Building (m)

httpe:buzzsouthafrica.comskyescrappers-south-africa

This building is an example of the artificial surfaces tested in Q2.4.5. It is made of concrete, steel and glass and will retain heat longer due to its artificial surfaces. Multiple reflections between the glass buidlings will reradiate absorbed heat. Buildings that are very close together will trap heat between the buildings and channel the wind in certain directions.

To differentiate between the grade of two river profiles as in Q2.5.5, learners need to examine the longitudinal profile to see what the shape is and identify features found along the profile. Both river profiles will have a permanent or ultimate base level of erosion, which is the sea. The graded river profile will have a smooth concave shape and there will not be any evidence of temporary base levels of erosion, as seen below in A. Where the river is ungraded, the river profile could have temporary base levels of erosion, like waterfalls, knickpoints, lakes or dams. The river profile will be multi-concave and not smooth as in B.

[Source: https://geographyas.info/rivers/long-and-cross-profiles/]
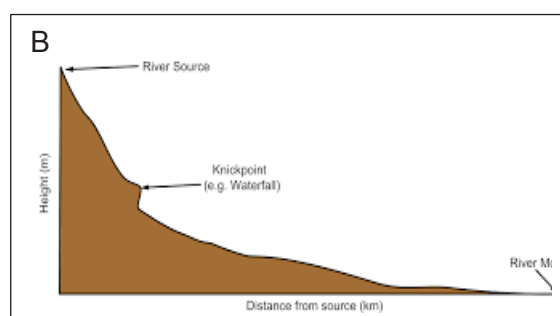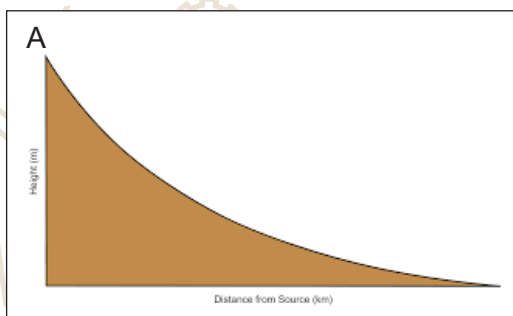
(d)   Levees as asked in Q2.6.4 are depositional features that are found in the lower course of the river. Due to the gradient becoming more gentle, the carrying capacity of the river decreases and the river load is deposited. When the river comes down in flood and the river overflows its banks, deposition occurs along the banks forming levees. In Q2.6.5 levees have both a positive and negative impact on farming on the adjacent floodplain. These features can become high enough to protect the flood plain from being flooded and allow farming to take place on the floodplain. They do, however, stop the natural deposition of fertile silt from taking place on the floodplain. Levees can block water on the floodplain from returning to the river, resulting in waterlogged fields and possible loss of crops.

[Source: http://www.coolgeography.co.uk/GCSE/AQA/Water%20on%20the%20Land/Meanders/Landforms%20Meanders.htm
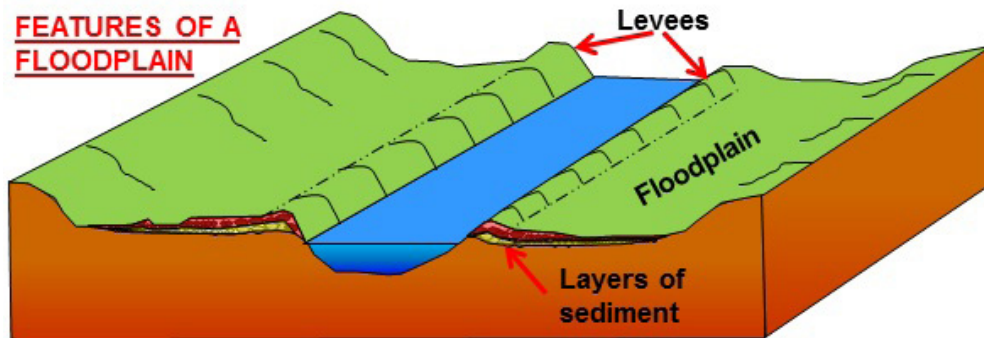
QUESTION 3: RURAL AND URBAN SETTLEMENTS, AND ECONOMIC GEOGRAPHY OF SOUTH AFRICA

Common Errors and Misconceptions

(a)   Q3.3 (15 marks) on land reform and the associated policies was not well answered.

(b)   Candidates were not able to discuss the causes of urban problems as asked in Q3.4.4 (8 marks). Although rapid urbanisation, as mentioned in the question, is a major cause of the urban problems, candidates were unable to account for the cause of these problems in more detail. As most candidates merely mentioned the urban problems, they could not be awarded any marks.

(c)   In Q3.6.5 (4 marks) candidates could not provide valid reasons why Richards Bay would be attractive to international investors. The word 'attractive' was unfamiliar in this context to some candidates who were unsure of how to respond and were giving answers about beautiful sites for tourism, for example. Candidates also did not understand the term 'infrastructure' and how it relates to Richards Bay.

Suggestions for Improvement

(a)   Q3.3 on land reform is very current and topical, especially with much debate about land expropriation making headlines in current newspaper articles. Teachers are encouraged to make use of these articles and to follow the media, while approaching the topic from many different perspectives. Land reform is covered in most textbooks under the subheadings of the three different land reform programmes: land tenure, land restitution and land redistribution. Through class discussions learners will be able to get an idea of how successful or unsuccessful some of these programmes have been.

(b)   The higher-order question in Q3.4.4 demanded that the candidates explain the causes of the specific urban problems that are dealt with in the *CAPS* document and Examination Guidelines. These urban problems are: traffic congestion, housing shortage, informal settlements, service provision, overcrowding, lack of planning, urban blight and inner-city problems. Candidates were required to identify four of these urban problems and to account for them occurring.

(c)   With regard to the topic in Q3.6.6, when teaching the prescribed SDIs, teachers will have to do some of their own research or get learners to find out some interesting facts about the specific SDI studied. This could be a great learning experience for all. Irrespective of which SDI is studied, the basic factors should be discussed and applied to the specific SDI. SDIs are found along major transport routes which have links to an export harbour and aim to attract foreign investors to uplift the local community through beneficiation of the local products. Teachers must focus on the factors that favour industrial development, i.e. availability of raw materials, access to power and water supply, skilled and unskilled labour force, and connectivity to local and overseas markets. Infrastructure is the collective term used to describe communication networks, power lines, road and rail routes and harbours, which are essential for any industrial development to take place.

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

Common Errors and Misconceptions

(a)   In Q4.3 (1 mark) candidates found it difficult to discern between the terms 'land-use zones' and 'land-use'.

(b)   In Q4.5.6 (4 marks) candidates were required to compare two challenges experienced in the PE-Uitenhage Industrial Region with the PWV Industrial Region. This question was not answered well by candidates.

Suggestions for Improvement

(a)   Q4.3 was based on land-use zones. The following examples of land-use zones are commonly accepted: Commercial, Residential, Industrial, Transition Zone and Rural-urban Fringe. A green belt is sometimes referred to as an example of land-use and not a specific land-use zone, as it is found within the rural-urban fringe or in the residential zone.

(b)   Teachers and learners need to take note and prepare adequately for the fact that it is possible to ask a question comparing or integrating two industrial regions or zones. This seems to be the trend with current or recent Geography papers. Teachers should adopt an integrated approach when it comes to the industrial regions, SDIs and IDZs.

6.5   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 6.5.1   Average Performance per Question as a Percentage in Paper 2
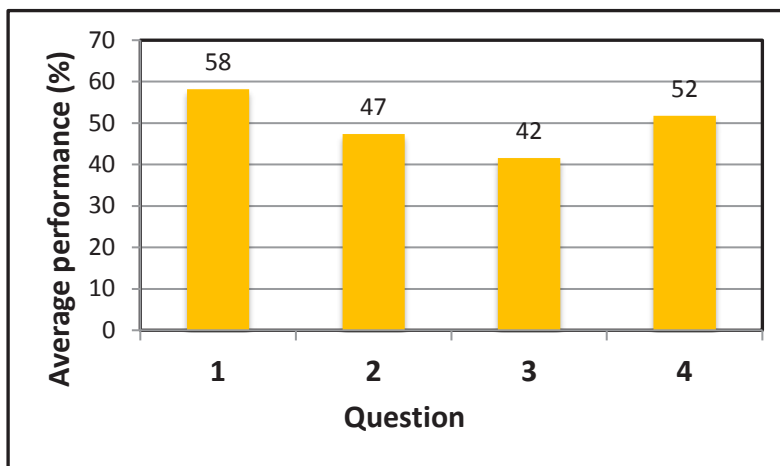
Q1	Multiple Choice
Q2	Map Caculations and Techniques
Q3	Application and Interpretation
Q4	Geographical Information Systems

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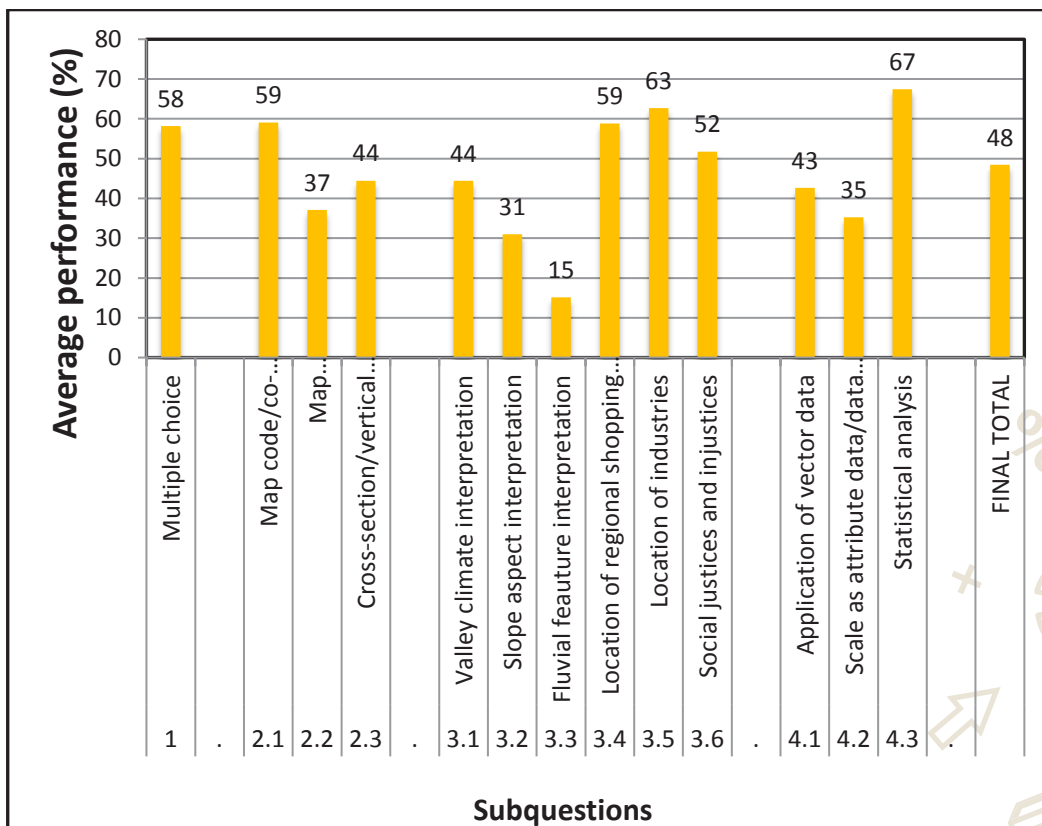
6.6 OVERVIEW OF LEARNER PERFORMANCE IN PAPER 2

General Comments

Similar areas of concern were raised in the diagnostic report of 2018. As these remain areas of concern in the context of the 2019 NSC paper, they are emphasised here once again.

(a)   Candidates were disadvantaged because they did not do an analysis of all the resources, the orthophoto map, the topographic map and the general information sheet, which would have assisted them in answering various questions.

(b)   Candidates struggled to orientate the orthophoto map to the topographic map. By using the highlighted red and black block on the topographic map, it is easier to orientate the two maps. Learners can also look for easily identifiable features on both maps to orientate them, e.g. a road.

(c)   Middle- to higher-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 these questions and did not understand what was expected of them.

(d)   There was an improvement in the answering of multiple-choice questions and calculations, but GIS continues to be a challenge for many candidates.

General Suggestions for Improvement

(a)   Learners need to be made aware of the significance of the information found on the sides of the maps, e.g. index to sheets, references and mean magnetic declination. This information assists learners in answering a significant number of questions.

(b)   Teachers need to update learners regarding new symbols and changes to symbols introduced under the reference section, e.g. 'R' now represents a reservoir and the symbol for perennial water can represent a dam. The identification and application of these new symbols to the map need to be emphasised.

(c)   Learners need to be made aware that there are distractors in the options given in the multiple-choice questions and must be taught to recognise subtle differences in the options given. Teachers are advised to update their training in setting compliant multiple-choice questions, which can include lower-, middle- and higher-order cognitive skills of testing. Learners should be made aware of the principles underlying multiple-choice questions.

(d)   Learners must be instructed to show all steps in calculations in order to get maximum marks. Calculations should be marked by teachers as directed in the NSC marking guidelines and the Examination Guidelines.

(e)   Teachers need to appreciate the importance of the immediate integration of mapwork when theory sections are taught. This will assist learners with application questions related to theory, e.g. Q3. The frequent use of topographic and orthophoto maps as teaching aids in theory will definitely assist. Mapwork skills and interpretation exercises should be regularly practised.

(f)   The correct understanding and interpretation of map scale is required. This is fundamental in answering a significant number of questions in the mapwork paper. Analysing both the scales of the topographic and orthophoto maps, e.g. their differences, will definitely improve learners' understanding of scale. Learners should understand what a 1 : 50 000 (topographic map) and 1 : 10 000 (orthophoto map) is.

(g)   Correct mapwork terminology needs to be taught. Learners must reference directions on a map using the correct compass points, e.g. North or South. When determining the grid reference of a particular feature on the map, learners should also give their answer in degrees, minutes and seconds.

(h)   The interpretation of symbols found on the topographic map needs to be emphasised with learners, e.g. the number of the trigonometrical station is found above the height or the dot indicates the location of the spot height. The number next to the spot height is the height in meters.

(i)   Learners must recognise that simply learning definitions of GIS concepts will not be sufficient. Learners need to be taught the significance and purpose of these GIS concepts and how to apply them. These concepts can be related to real-life situations, e.g. determining the location of a new shopping centre as an example of buffering.

(j)   Teachers are encouraged to attend GIS courses and to use relevant computer programmes available to schools to improve their GIS knowledge. The Department of Land Reform and Rural Development also offer free assistance and training in GIS.

(k)   Learners must understand that the difference in action words used in mapwork is of utmost importance, as it could cost them marks. Learners must be able to identify the following factors on the maps: human-made feature (regular shapes) and natural features (irregular shapes), human factors, physical (natural), economic, social and environmental factors.

(l)   Learners should be introduced to a variety of maps that reflect the different regions of South Africa, e.g. inland regions or coastal regions. This will prepare them for answering questions on all areas of South Africa.

(m)   Teachers should have a variety of maps available to them, from past NSC examinations and electronic maps of all NSC examinations given to the provinces by the DBE.

(n)   Learners should have a good knowledge of aerial photography which covers identifying features on the orthophoto map, e.g. using texture, tone, shadow and shape. Using shadows to identify the time an aerial photograph was taken is one such skill.

6.7   ANALYSIS OF LEARNER PERFORMANCE IN EACH QUESTION IN PAPER 2

QUESTION 1: MULTIPLE-CHOICE QUESTIONS

Common Errors and Misconceptions

(a)   In Q1.4 (1 mark) some candidates experienced difficulty working out the map number using the index sheet for the orthophoto map. It seems that candidates incorrectly used the topographic map and therefore could not reach the correct answer.

(b)   Q1.6 (1 mark) candidates struggled to determine the direction of flow of the river using evidence from the maps.

(c)   In Q1.9 (1 mark) candidates had difficulty integrating their theory knowledge and applying it to the mapwork paper. They could not identify the waterfall as a temporary base level of erosion. A similar question was also asked in the theory paper.

(d)   Candidates failed in Q1.11 (1 mark) to identify the correct type of settlement based on the functions it provided to the surrounding rural area.

(e)   In Q1.15 (1 mark) candidates experienced problems differentiating between a conical hill and a butte. Once again, the integration of theory to mapwork is a challenge.

Suggestions for Improvement

(a)   Learners must discern which map is required for a particular question to be answered. In the case of the map index sheet (Q1.4), it referred to the orthophoto map and not the topographic map.

(b)   In Q1.6 identifying the acute angle where the tributaries join the main stream was the evidence required to answer this question. Another way of determining direction of flow of the river is by looking at the decrease in height using spot heights, trigonometrical station, contour lines. Another option is by using the location of a dam wall along a river.

(c)   Q1.9 required a practical application of theoretical knowledge in identifying a fluvial landform (e.g. waterfall) as a temporary base level of erosion. Temporary base levels of erosion are: waterfalls, lakes, dams, knickpoints and rapids.

(d)   Learners need to be able to identify the various types of towns taught in theory on the topographic map (Q1.11). Examples of these towns are central place town, specialised town, gap town and break-of-bulk town.

(e)   The skill the learner is expected to use to answer Q.1.15 is to refer to both the orthophoto map and the topographic map to determine the geomorphological feature. By examining the topographic map, it is clear that the feature is a conical hill, as it has no flat top, which can be seen by the arrangement of contour lines at the highest point of the feature.

(f)   For multiple-choice questions, learners are encouraged to use capital letters to depict their responses in the appropriate block. This is to ensure that their response is clear. Capital A, B, C and D are more easily discernible. 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.

QUESTION 2: MAP CALCULATIONS AND TECHNIQUES

Common Errors and Misconceptions

(a)   Candidates did not read Q2.1.1 (5 marks) carefully when it referred them to the orthophoto map and not the topographic map. Some candidates also experienced challenges regarding the correct use of equipment, e.g. ruler and protractor. This led to incorrect measurements.

(b)   In Q2.1.2 (1 mark) candidates experienced challenges interpreting scale. They indicated that the orthophoto map was larger than the topographic map instead of indicating that the scale of the orthophoto map is larger than the scale of the topographic map.

(c)   In Q2.2.1 (5 marks), when calculating magnetic declination, a significant number of candidates did not indicate the degrees and minutes in the answer. Others struggled to convert the minutes into full degrees.

(d)   In Q 2.2.2 (2 marks) many candidates gave incorrect measurements for true bearing that was out of the range by one or two degrees. This could be due to incorrect equipment, as not all protractors are calibrated.

(e)   In Q2.3.1 (2 marks) candidates could not identify features on the cross-sections by reading the contour lines on the topographic map.

(f)   The concept of intervisibility tested in Q2.3.2 (3 marks) was not well answered by most candidates.

(g)   The concept of ratio scale in Q2.3.3 (1 mark) still remains a challenge.

Suggestions for Improvement

(a)   For accurate measurement for calculations of area such as in Q2.1.1, learners need to use the ruler correctly. The mm side of the ruler needs to be used as it will provide the more accurate measurement. Using the cm side will probably require estimations, which unnecessarily complicates the answering of a question requiring measurements.
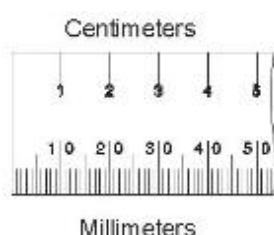
(b)   Learners should use highlighters to emphasise important words in the question. This will avoid mistakes, like referring to the wrong map, e.g. Q2.1.1 refers to the orthophoto map and not the topographic map.

(c)   In Q2.1.2 learners must understand that the scale of the topographic map is 1 : 50 000 and that the scale of the orthophoto map is 1 : 10 000. This means that the topographic map scale is 5 x smaller than that of the orthophoto map. When looking at the same feature on both maps, the orthophoto map feature will appear 5 x larger than on the topographic map.

(d)   Teachers are advised to use past NSC marking guidelines to emphasise the importance of showing degrees and minutes when answering magnetic declination calculations, as in Q2.2.1. Learners must note that a mark is allocated for showing the addition sign when calculating the magnetic declination for the year stipulated. For the final answer, minutes must be converted to degrees if it is 60' or more. It is preferable to convert when determining the total change. When the change is westwards, the process is to add; when it is eastwards, the process is to subtract.

2.2.1   Calculate the magnetic declination for 2019 using the information on the topographic map. Show ALL calculations. Marks will be awarded for calculations. Clearly indicate the direction in relation to true north in your final answer.

Difference in years: 17✓

Mean Annual change: 12 'W ✓

Total Change: 17 x 12' = 204'
= 3°24'W ✓

Magnetic declination for 2019: 20° 06'W + ✓ *3°24'W*
= 23° 30'W of true north ✓   (5 x 1)   (5)

(e)   To measure the bearing accurately for Q2.2.2, the learner must use the protractor correctly. When using the protractor, learners must ensure that the zero measurement is on the True North line. The centre of the protractor must be on the starting point feature.

(North)   0°

45°   (North East)

Center

90°   (East)

135° (South East)

(South)   180°
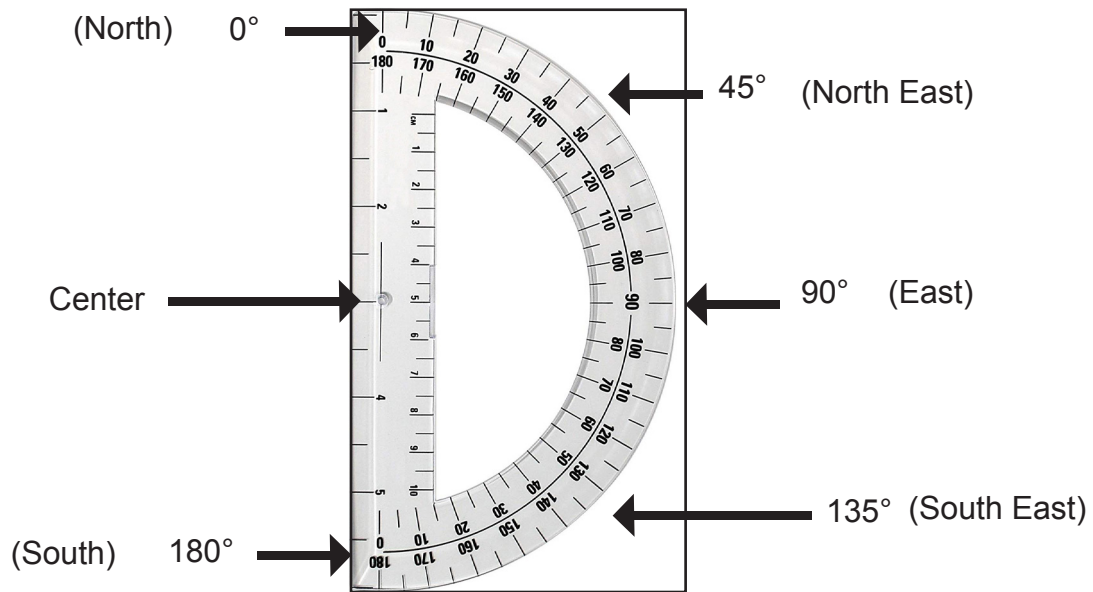
All learners' rulers and protractors should be checked for accuracy with calibrated ones. This will avoid answers out of the range.

(f)   Teachers need to ensure that learners can draw and interpret Cross-section as in Q2.3.1, which allows them to use the contour lines to determine the shape or gradient of a particular feature from the side. Teachers should start with simple illustrations to ensure that learners understand the process. Cross-section can be used to calculate the vertical exaggeration of a feature.

CONTOUR MAP AND CROSS-SECTION
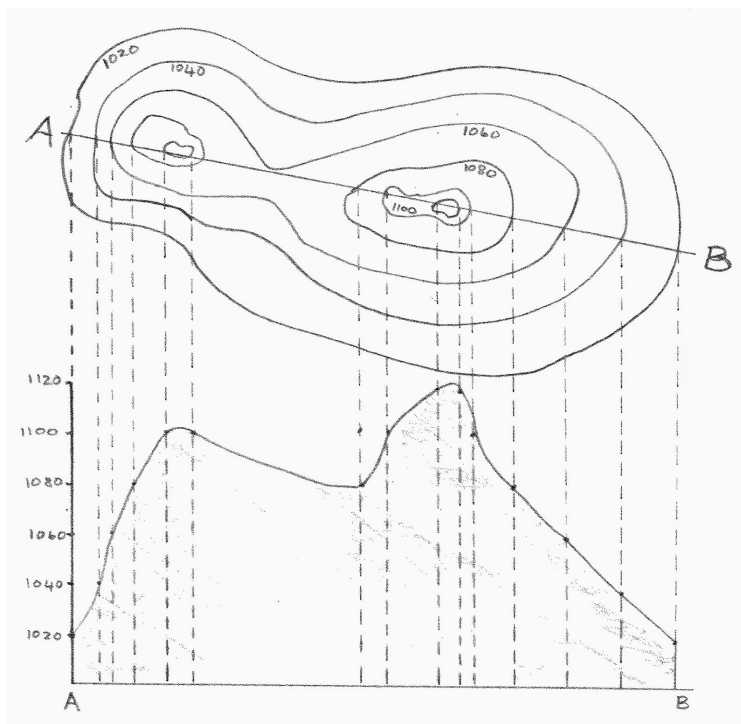
(g)   Teachers should use simple visuals to explain concepts such as intervisibility as tested in Q2.3.2. In the diagram below, line of sight A shows intervisibility, while line of sight B shows no intervisibility due to the fact that there is a higher lying feature in between.
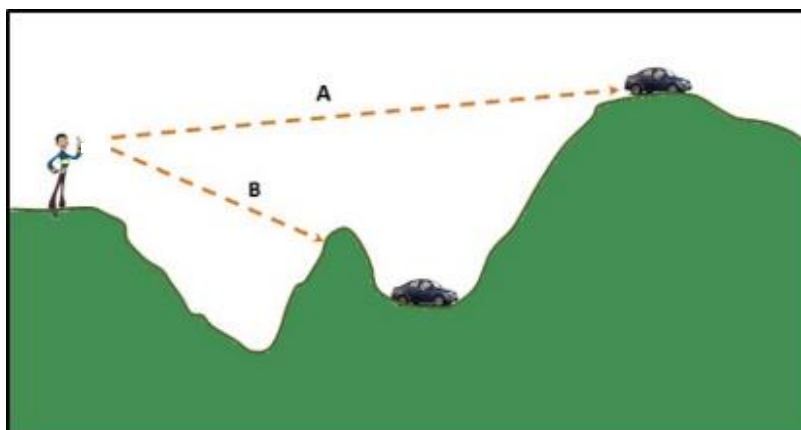
Intervisibility (line of sight)

It may be necessary to determine what area of ground you can view from a particular location.

You can say that two places or features are intervisible if one can be seen from the other. If you cannot see one feature from the other, then you can say that the place which cannot be seen is in 'dead ground'.

Two places will not be intervisible if there is an area of higher land between them.

(h)   In Q2.3.3 the learner was required to convert the vertical scale of the cross-section to a ratio scale. This means that the learner had to consult the cross-section and read off the vertical scale, which in this case was 1 cm that represents 5 m. They were then required to convert the 5 metres into cm and represent their answer as a ratio, e.g. 1 : 500. This is achieved by multiplying 5 x 100.

QUESTION 3: APPLICATION AND INTERPRETATION

Common Errors and Misconceptions

(a)   Q3.1.2 (3 marks) was a linked question, which meant that if candidates got the first part incorrect, the second part could not receive any marks.

(b)   Although Q3.2.1 (1 mark) and Q3.2.2 (1 mark) were not linked, candidates seemed to get the second part incorrect if they did not get the first question correct. Candidates did not take note of the instruction word, which referred to physical factors only. Many gave human factors as answers.

(c)   The emphasis in Q3.2.3 (2 marks) was on economic factors regarding the advantage of the type of settlement pattern. Candidates did not discuss economic factors, but rather social factors.

(d)   In Q3.3.1 (1 mark) candidates lacked understanding of the concept 'aerodrome'. Candidates identified the 'land use' instead of the 'land-use zone'.

(e)   The term 'irrigation networks' in Q3.4.2 (4 marks) did not seem to be familiar to many candidates. In some cases, candidates wrote about the irrigation network, but did not relate it to the growing of sugar cane.

(f)   In Q3.5.3 (2 marks) candidates were expected to focus on the location of the settlement with respect to micro-climates. Candidates struggled to apply their theoretical knowledge with regards to the micro-climate experienced at the settlement.

Suggestions for Improvement

(a)   In Q3.1.1 and Q3.1.2 the skill of interpreting maps was tested by way of identifying where the oxbow lake will form. This required candidates to study the contour lines and observe the underlying rock to assess which place, R or S, had the least resistant rock. At S the contour lines are far apart and there is no evidence of hard outcrops of rock, meaning that this would be the place for the oxbow lake to form, as the river would be able to erode through the area faster.

(b)   Learners must read the questions with understanding of what the key words are. In this case they were asked to name the settlement pattern in Q3.2.1. The settlement has a dispersed pattern which is clearly seen by the arrangement of the rural dwellings which are far apart.

(c)   In Q3.2.2 candidates had to give one physical factor that determined the type of settlement pattern, by interpreting the area numbered 10 on the orthophoto map. It is clear that the settlements are located on flat land, as the contour lines are far apart. The settlement is surrounded by cultivated land and as such the soil is fertile. There is also sufficient water supply from the river close by.

(d)   Q3.2.3 required candidates to give economic advantages for this settlement pattern. Farmers would own their own property, make their own decisions and be able to introduce new farming technology and increase their productivity and profit.

(e)   In Q3.3.1 candidates were required to identify the land-use zone which is the rural-urban fringe. The aerodrome was located here, as it requires large amounts of flat land and should be away from the built-up area, as it generates large amounts of noise and air pollution.

(f)   Q3.4.2 tests knowledge of an irrigation network. This comprises all the different means used to transfer water from one place to another, e.g. canals, furrows, dams and reservoirs. This irrigation network provides water from the Pongola River for the farming of sugar cane in areas away from the river to ensure all year productivity of sugar cane.

(g)   Q3.5.3 tested why the katabatic winds will not affect the settlement of Phakamisa due to its location on the mid-slope of a valley. The climatic conditions on the mid-slope are usually warmer during both day and night due to the direct heating of the sun's rays and the position of the thermal belt at night. This is also an ideal place to grow crops, as it is above the frost pocket. Katabatic winds drain cold air into the valley floor at night, which can lead to the formation of a frost pocket if temperatures drop below 0 °C. Learners need to have a good understanding of microclimates for the mapwork paper, as this is often tested.

QUESTION 4: GEOGRAPHICAL INFORMATION SYSTEMS (GIS)

Common Errors and Misconceptions

(a) In Q4.3.1 (1 mark) and Q4.3.2 (2 marks) the concept of 'buffering' was tested. Candidates still struggle to understand and relate to this concept.

(b) Q4.4 (1 mark) and Q4.4.1 (4 marks) tested 'data integration', a concept to which candidates could not relate.

Suggestions for Improvement

(a) To buffer is to demarcate an area around or along a spatial feature, as asked in Q4.3.1. Q4.3.2 asked why the lack of buffering would be considered poor river management practice. Learners should be able to apply this concept to the stipulated blocks on the topographic map and be able to give evidence from the map of poor river management. This involves responses like fertilisers and pesticides from the farm land gets deposited into the river, flooding of the river or soil erosion could silt up the river and the biodiversity of the area could be threatened.

(b) Q4.4.1(1 mark) and Q4.4.2 (4 marks) assessed data integration for a farmer to decide on where to extend his farm. He would have to examine a number of data layers to get the answers he needs. In this case, the appropriate data layers that should have been mentioned are: drainage/catchment area, topography/gradient/relief, soil and natural vegetation.

Chapter 7

HISTORY

The following report should be read in conjunction with the History question papers of the November 2019 NSC Examinations.

7.1 PERFORMANCE TRENDS (2015–2019)

The number of candidates who wrote the History examination in 2019 increased by 10 193 in comparison to the number in 2018. The performance of candidates continues to reflect an upward trend. This year there was a marginal improvement from 89,7% in 2018 to 90,0% of candidates achieving at the 30% level, with 74,0% achieving at the 40% level in comparison to the 72,6% in 2018.

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
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
2019	164 729	148 271	90,0	121 936	74,0

It is evident from the statistics that the number of candidates taking History as a subject in the FET phase has increased significantly since 2015. Simultaneously, there has been a 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 Paper 1 and Paper 2 and this is also 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 a significant number of candidates were unable to answer higher-order questions. These questions required candidates to interpret, analyse, evaluate, compare and determine the usefulness, limitations and reliability of evidence in sources. Furthermore, a large number of candidates could not write logical and coherent paragraphs based on the key question.

In Section B of the question papers (essay questions), the majority of candidates displayed good content knowledge but were unable to take a stance and develop a balanced and independent line of argument. Several essays lacked introductions and convincing conclusions.

Teachers must make every 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)

	2015	2016	2017	2018	2019
% achieved at 30% and above	84.0	84.0	86.0	89.7	90.0
% achieved at 40% and above	63.2	64.3	67.5	72.6	74.0
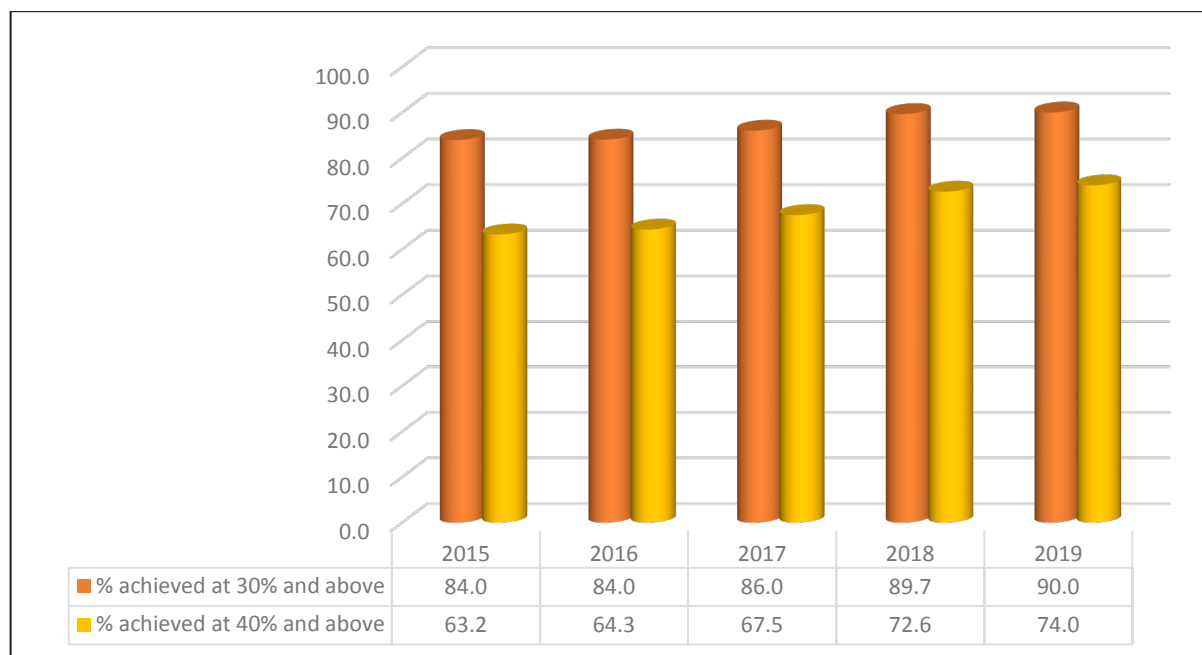
Graph 7.1.2   Performance Distribution Curves in History (Percentage)

	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
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
2019	0.1	2.1	7.8	16.0	21.6	21.6	16.2	9.2	4.4	0.9
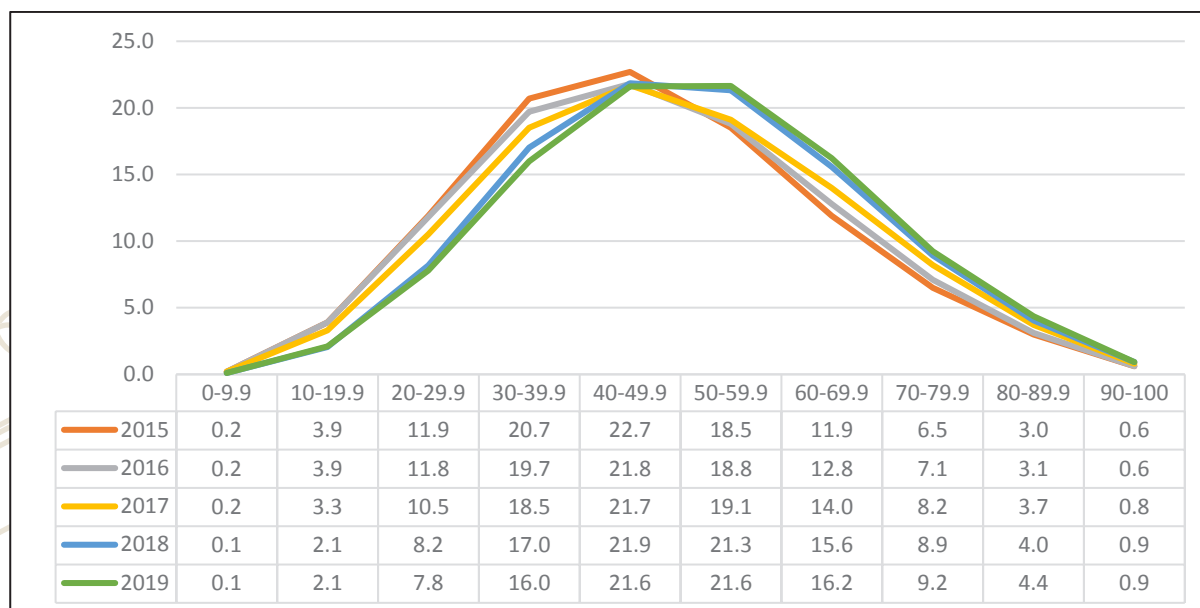
7.2   OVERVIEW OF LEARNER PERFORMANCE IN PAPER 1

Generally, candidates' performances in this question paper ranged from fair to good. It was evident that some candidates lacked the relevant content knowledge to make meaningful responses in specific topics (e.g. Independent Africa: Case Study – Angola and Comparative Study – the Congo and Tanzania).

In Section A: Source-based questions, many candidates were unable to effectively extract, select, interpret, analyse, evaluate and synthesise information from the sources that were provided. This resulted in unsatisfactory responses to specific higher-order questions, where candidates were unable to ascertain the limitations, reliability and usefulness of sources.

A large number of candidates were unable to use the relevant information in the sources and their own knowledge to effectively write a well-structured paragraph.

In Section B: Essay questions, several candidates demonstrated an understanding of the content knowledge but were less successful in selecting, organising and constructing a relevant line of argument in responding to 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.

Graph 7.3.1: Average Marks per Question expressed as a Percentage in Paper 1
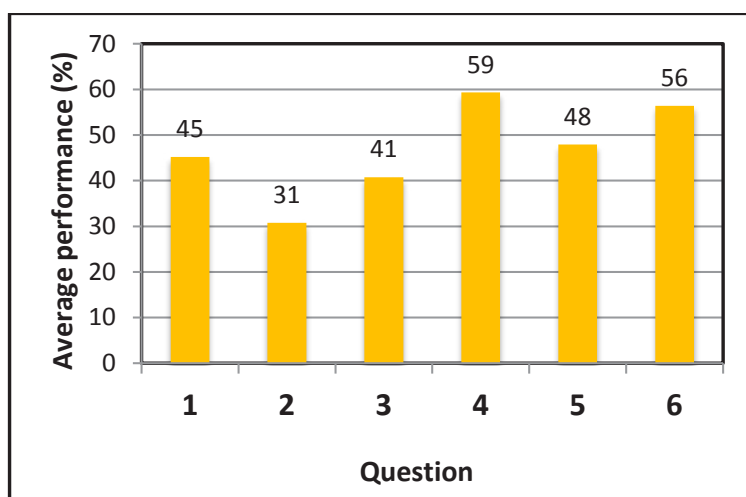
Q1	The Cold War: Containment and Brinkmanship: The Cuban Missile Crisis
Q2	Independent Africa: Case Study – Angola
Q3	Civil Society Protests from the 1950s to the 1970s: The Black Power Movement
Q4	Case Study – China
Q5	Independent Africa: Comparative Case Study – The Congo and Tanzania
Q6	Civil Society Protests from the 1950s to the 1970s: The Civil Rights Movement

Graph 7.3.2: Average Marks per Subquestion Expressed as a Percentage in Paper 1
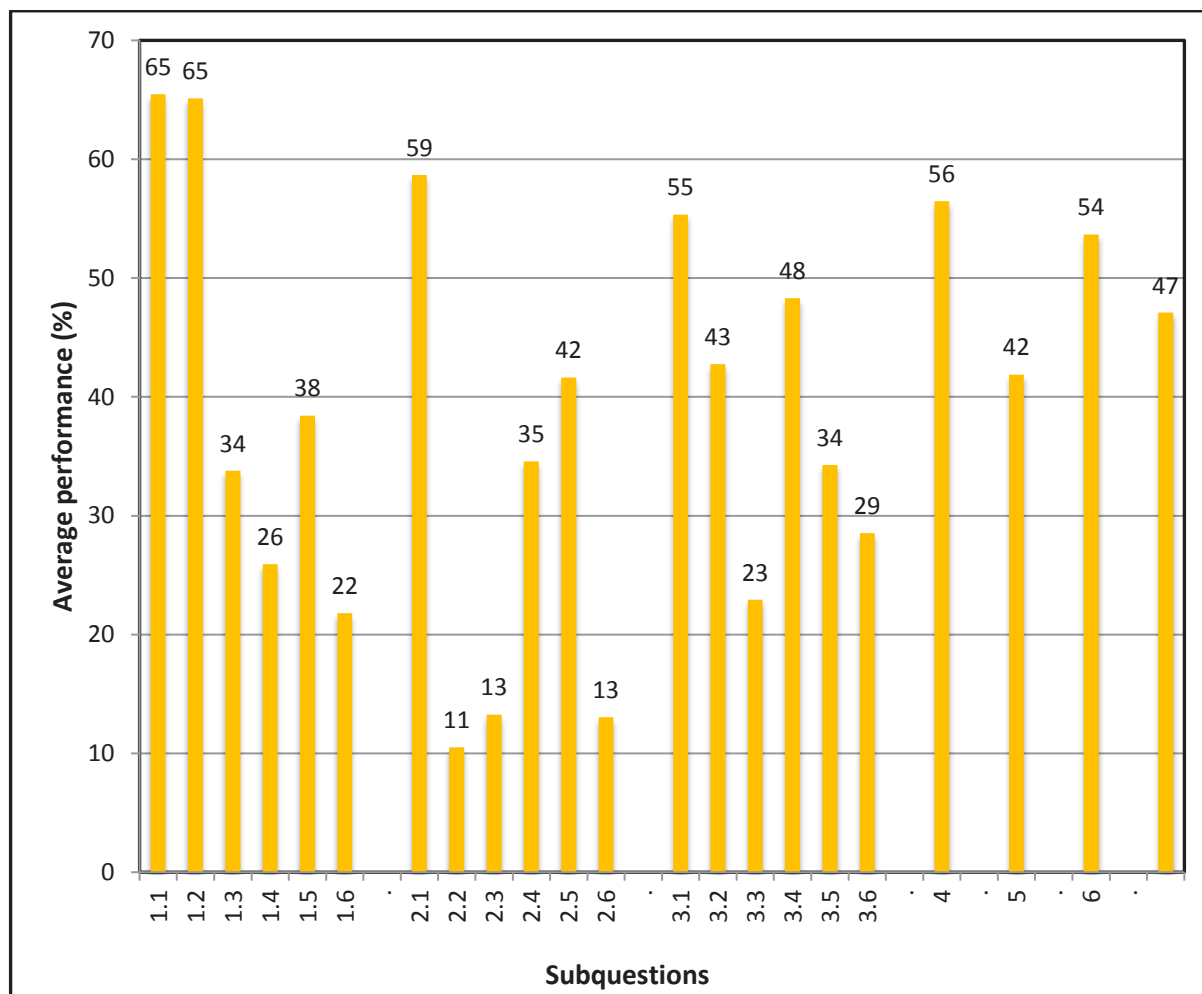
7.4 ANALYSIS OF LEARNER PERFORMANCE IN EACH QUESTION IN PAPER 1

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 Q1.1.1 many candidates could not define the term *democracy* in their own words. Candidates gave vague and generalised responses such as 'you are free to do as you please'.

(b)   In Q1.3.2 a large number of candidates were unable to comment on the words, 'Ultimatum to Krushchev "Move those missiles" ', in the context of the crisis in Cuba. They simply rephrased the statement instead of providing a comment.

(c)   In Q1.4 several candidates were unable to explain how the information in Source 1B supported the evidence in Source 1C regarding President Kennedy's standpoint on the deployment of Soviet missiles to Cuba.

(d)   In Q1.5.4 a number of candidates could not explain the limitations of this source for a historian studying the Cuban Missile Crisis. They merely mentioned the usefulness of the source.

QUESTION 2: INDEPENDENT AFRICA: CASE STUDY – ANGOLA

In comparison to previous years, it was evident that more candidates attempted this question. Generally, the performance ranged from poor to satisfactory.

Common Errors and Misconceptions

(a)   In Q2.2.1 a large number of candidates were unable to use the visual clues in the cartoon to explain the messages that were conveyed. They lacked the skill of how to use the content knowledge of the Cold War in Angola to answer this question.

(b)   In Q2.2.2 most candidates struggled to offer appropriate comments on the statement 'IF YOU LIKED VIETNAM, YOU'LL LOVE THIS ONE!' in the context of Angola. Candidates could not link the Cold War that was fought in Angola with Vietnam.

(c)   In Q2.3 many candidates were unable to explain how the information in Source 2A supports the evidence in Source 2B regarding the USA's involvement in the Angolan Civil War.

(d)   In Q2.4.4 many candidates had difficulty in explaining to what extent the information in the source was reliable when researching the reasons for South Africa's involvement in Angola. Most candidates were unable to take a stance and explain the reliability of the source.

(e)   In Q2.5.2 a large number of candidates could not define the term *colonialism* in their own words. Candidates confused the term *colonialism* with *colonisation*.

(f)   In Q2.5.4 several candidates found it difficult to explain why Castro did not want Angola to fall 'in the hands of South African racists'. Candidates' responses were generally vague and irrelevant.

(g)   In Q2.6 many candidates were unable to use the information in the relevant sources and their own knowledge, to write a coherent paragraph explaining why foreign powers became involved in the Angolan Civil War between 1974 and 1976.

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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 Q3.1.3 several candidates could not explain why Fred Hampton 'promoted a shift away from capitalism to socialism'. Most candidates could not answer the question in a comparative manner.

(b)   In Q3.3 many candidates were unable to explain how the information in Sources 3A and 3B supported each other regarding the role that Fred Hampton played in mobilising African Americans.

(c)   In Q3.5.2 the majority of candidates could not explain the messages that were conveyed in the poster.

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)   A significant number of candidates were unable to critically discuss the statement 'Mao Zedong's policies of the Great Leap Forward and the Cultural Revolution transformed the People's Republic of China from an agricultural state to a modern industrial state between 1957 and 1969'. Several candidates regurgitated pre-prepared essays based on the 2018 NSC November question paper.

(b)   A number of candidates' essays lacked introductions and 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 a small percentage of candidates. Generally, the performance ranged from poor to satisfactory.

Common Errors and Misconceptions:

(a)   Most candidates were unable to take a stance and state whether they agree or disagree with the statement 'The leaders of the Congo (Mobutu Sese Seko) and Tanzania (Julius Nyerere) both implemented different political and economic policies after they attained independence from colonial rule'.

(b)   Several candidates lacked the ability to draw comparisons between the Congo and Tanzania, instead they wrote very descriptive essays outlining how Mobutu Sese Seko and Julius Nyerere addressed the challenges that their respective countries faced. Most 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. Performance ranged from satisfactory to good.

Common Errors and Misconceptions

(a)   Many candidates were able to take a stance and explain to what extent the various forms of protests by the Civil Rights Movement played a significant role in ending discrimination against African Americans in the 1960s. Some, however, gave unnecessary background information on the 1950s, especially on the role of Rosa Parks.

(b)   A few candidates wrote essays that lacked introductions, logical and sequential body of events as well as persuasive conclusions.

7.5. OVERVIEW OF LEARNER PERFORMANCE IN PAPER 2

(a)   Generally, candidates' performance in this question paper ranged from fair to good.

(b)   In Section A: Source-based questions, it was evident that many candidates were unable to extract, select, interpret, analyse, evaluate and synthesise information from the sources that were provided. In addition, some candidates were unable to define concepts in historical context, compare perspectives and ascertain the usefulness and limitation of evidence in sources.

(c)   Many candidates found it challenging 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 demonstrated an understanding of the content knowledge but were unsuccessful in selecting, organising and constructing a relevant line of argument in responding to the question posed.

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.

Graph 7.6.1: Average Marks per Question Expressed as a Percentage in Paper 2
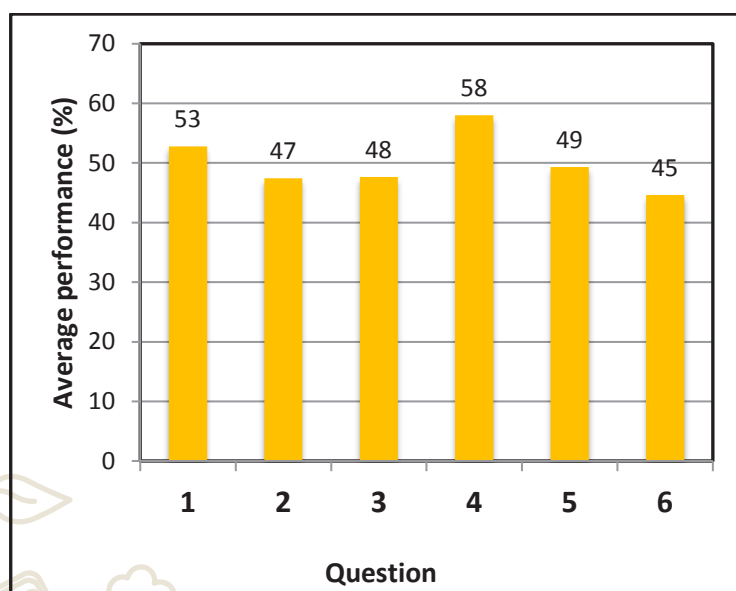
Q1	Civil Resistance, 1970s to 1980s: South Africa
Q2	The coming of democracy to South Africa and coming to terms with the past
Q3	The end of the Cold War and a New World Order, 1989 to the present
Q4	Civil Resistance, 1970s to 1980s: South Africa: The crisis of apartheid in the 1980s
Q5	The coming of 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

Graph 7.6.2: Average Marks per Subquestion Expressed as a Percentage in Paper 2
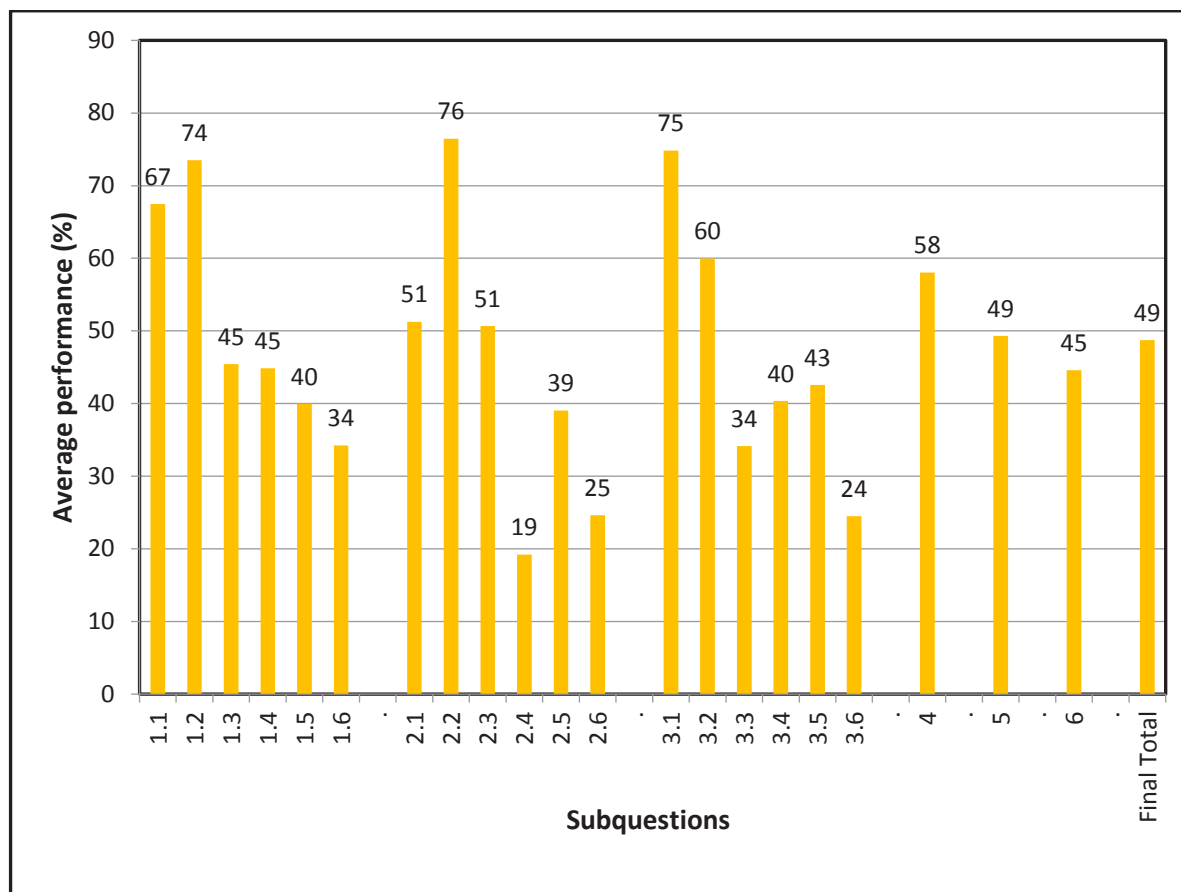
7.7   ANALYSIS OF LEARNER PERFORMANCE IN EACH QUESTION IN PAPER 2

SECTION A: SOURCE BASED QUESTIONS

QUESTION 1: CIVIL RESISTANCE, 1970s TO 1980s: SOUTH AFRICA

The majority of candidates attempted this question and performances ranged from fair to good.

Common Errors and Misconceptions

(a)   In Q1.1.2 a substantial number of candidates were not able to define the term *apartheid* in their own words. They provided vague and inappropriate responses such as 'different races' and 'white people don't like black people'.

(b)   In Q1.3.2 several candidates were unable to explain how Pelser justified the banning of the SASO 8. Many candidates did not understand the meaning of 'justify'.

(c)   In Q1.3.4 the majority of candidates found it difficult to explain what Helen Suzman implied by the statement 'government was responsible for creating an indestructible (everlasting) black nationalism, which is only a by-product of white nationalism'. It was evident that they lacked an understanding of the concept 'nationalism' and its impact.

(d)   In Q1.4.3 many candidates were unable to explain the usefulness of the information in the source when researching the role of SASO.

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 performance ranged from poor to satisfactory.

Common Errors and Misconceptions

(a)   In Q2.1.3 many candidates were unable to explain why the TRC was mandated to investigate human rights abuses that were committed between 1 March 1960 and 10 May 1994. They inaccurately responded to this question by stating the aims and objectives of the TRC.

(b)   In Q2.1.4 a large number of candidates could not define the term *amnesty* in the context of the TRC. Candidates gave vague and generalised responses such as 'amnesty means forgiveness'.

(c)   In Q2.3.2 a significant number of candidates were unable to explain whether the TRC was justified in granting Benzien amnesty for the murder of Ashley Kriel.

(d)   In Q2.4 many candidates struggled to explain how the information in Sources 2B and 2C differed from each other regarding the murder of Ashley Kriel.

(e)   In Q2.5.2 several candidates found it difficult to ascertain the usefulness of the source regarding the circumstances around the death of Ashley Kriel.

(f)   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 to explain how the Truth and Reconciliation Commission dealt with the murder of political activist, Ashley Kriel.

QUESTION 3: THE END OF THE COLD WAR AND A NEW WORLD ORDER, 1989 TO THE PRESENT

Very few candidates answered this question and performance ranged from fair to good.

Common Errors and Misconceptions

(a)   In Q3.3 candidates could not compare evidence presented in Sources 3A and 3B. They failed to explain how the information in these sources supported each other regarding the 10th BRICS Summit.

(b)   In Q3.4.2 a large number of candidates lacked the analytical and interpretative skills to explain the purpose of the investment deals that were signed at the BRICS Summit.

(c)   In Q3.4.4 most candidates were unable to explain the limitations of the source to a historian studying whether South Africa benefitted from BRICS.

(d)   In Q3.5.2 a number of candidates could not define the term *capitalism* in their own words. Candidates gave generalised responses such as 'capitalism is state-owned and people have no say'.

(e)   In Q3.6 a significant number of candidates were unsuccessful in writing a logical paragraph explaining the impact that the 2018 BRICS Summit had on South Africa.

SECTION B: ESSAY QUESTIONS

QUESTION 4: CIVIL RESISTANCE, 1970s TO 1980s: SOUTH AFRICA – THE CRISIS OF APARTHEID IN THE 1980s

The performance of candidates in this question ranged from fair to good.

Common Errors and Misconceptions

(a)   A significant number of candidates attempted this question but some of them were unable to take a stance and explain to what extent boycotts, disinvestments and sanctions by international anti-apartheid movements were responsible for the eventual downfall of PW Botha's regime in the 1980s.

(b)   A large number of candidates did not write an introduction and gave a narrative account which did not address the demands of the question.

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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 struggled to critically discuss the roles that various political organisations played in overcoming the challenges that South Africa faced between 1990 and 1994.

(b)   Candidates merely narrated the various turning points that occurred in South Africa between 1990 and 1994, without critically discussing the roles that various political organisations played in the birth of a democratic South Africa.

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 take a stance and indicate whether they agree or disagree with the statement posed.

(b)   Candidates simply wrote narrative essays, with unnecessary and irrelevant background information on the fall of the Berlin Wall.

7.8.   SUGGESTIONS FOR IMPROVEMENT IN BOTH PAPER 1 AND PAPER 2

Teachers should:

(a)   Ensure that the prescribed content, as contained in the *CAPS* and the *2017 Examination Guideline* document, is comprehensively covered and is aligned to the Annual Teaching Plan (ATP).

(b)   Expose learners to a variety of sources (e.g. visual, written, statistical and electronic) and provide opportunities to develop 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 and relevant notes so that they have an in-depth understanding of the content focus areas. Refer to past NSC question papers for practical examples as to how these difficult historical skills can be taught.

(c)   Equip learners 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 in order to improve their historical consciousness. These foundational historical skills must be underpinned with the teaching and learning of the prescribed content that has been delineated into source-based and essay questions.

(d)   Sharpen paragraph-writing skills by ensuring that learners do the following:

- Read the question and underline the key words.
- Study all sources to gain 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.
- Always make reference to the question when writing a paragraph.

(e)   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.

(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. A sample of learner responses should be used to train teachers on how to correctly use the levels rubric and matrix to assess paragraphs and essays. Orientate teachers on the principles and criteria on how to mark source-based, paragraph and essay questions which are found on pages 2 to 6 of the NSC November 2019 Marking Guidelines.

(c)   Workshop educators on the findings of the NSC November 2019 Diagnostic Report.

(d)   Develop appropriate resource materials which both teachers and learners can interact with.

(e)   Workshop teachers on challenging topics identified in the NSC November 2019 examination.

Teacher development should:

(a)   Ensure that new teachers are supported and guided on pedagogy, content and teaching methodology.

(b)   Assist teachers on how to plan, prepare and present interactive History lessons.

(c)   Prepare teachers to focus on English Across the Curriculum (EAC).

Chapter 8

LIFE SCIENCES

The following report should be read in conjunction with the Life Sciences question papers of the November 2019 Examination.

8.1   PERFORMANCE TRENDS (2015–2019)

The number of candidates who wrote the Life Sciences examination in 2019 decreased by 9 004 in comparison to that of 2018. The performance of the candidates in 2019 reflects a drop at the 30% level from 76,3% in 2018 to 72,3% as well as at the 40% level from 51,7% in 2018 to 49,0%.

Table 8.1 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
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
2019	301 037	217 729	72,3	147 436	49,0

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 performance in the subject. Reproduction covers 45 marks out of 150 in Paper 1 and Genetics and Evolution cover 110 of the 150 marks in Paper 2. Teacher workshops should therefore focus strongly on the teaching of Reproduction, Genetics and Evolution.

Another area of poor performance remains the questions on scientific investigations, as evidenced once again in Papers 1 and 2 of 2019. 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)

	2015	2016	2017	2018	2019
■ % achieved at 30% and above	70.4	70.5	74.4	76.3	72.3
■ % achieved at 40% and above	46.0	45.2	52.1	51.7	49.0
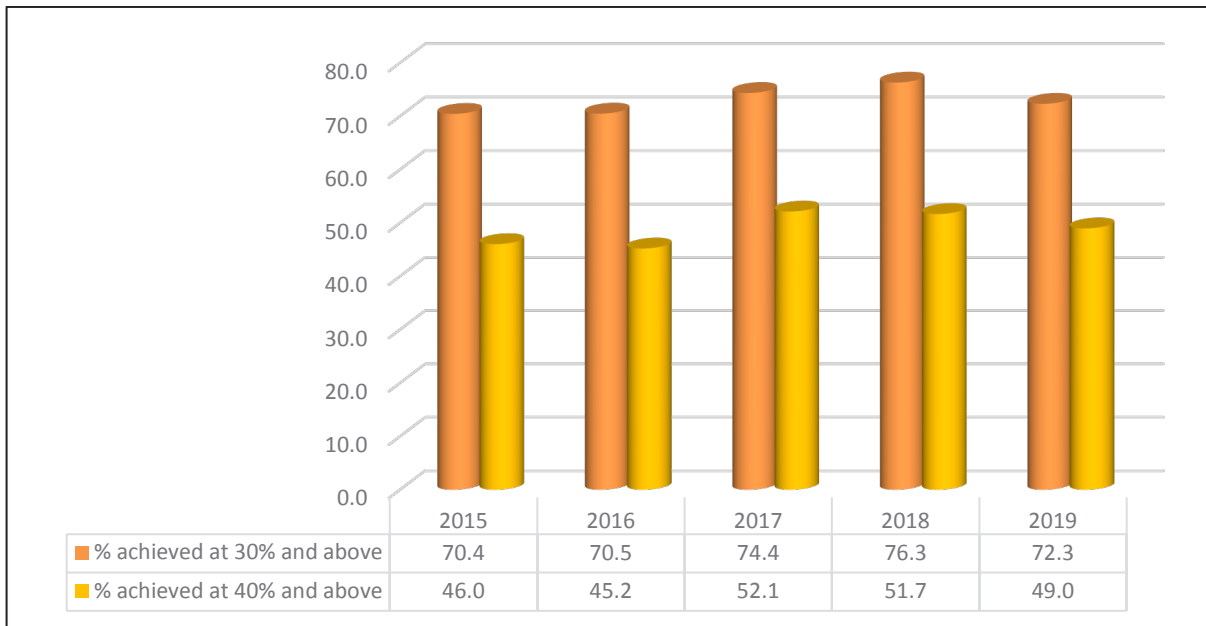
Graph 8.1.2 Performance Distribution Curves in Life Sciences (Percentage)

	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
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
2019	0.2	8.2	19.2	23.3	19.1	13.4	8.6	5.1	2.4	0.4
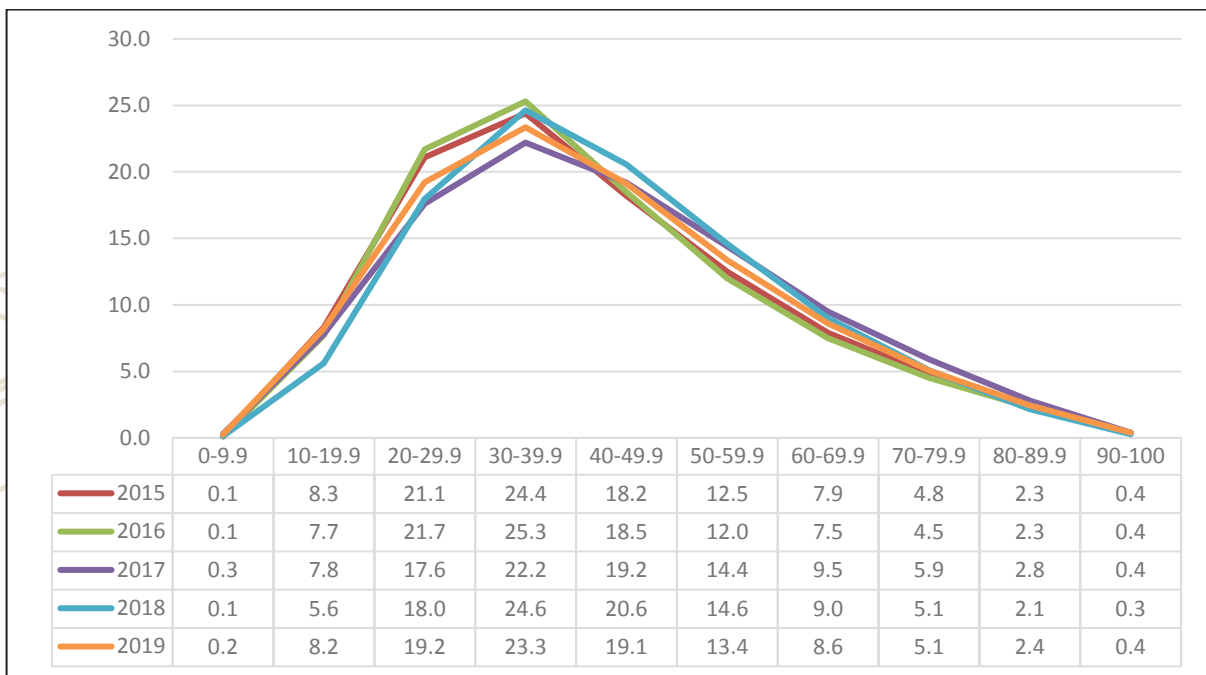
8.2 OVERVIEW OF LEARNER PERFORMANCE IN PAPER 1

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 and Human Reproduction.

(d)   The candidates' performance indicates that the work on Human Impact on the Environment, 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 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 8.3.1 Average Marks per Question Expressed as a Percentage: Paper 1
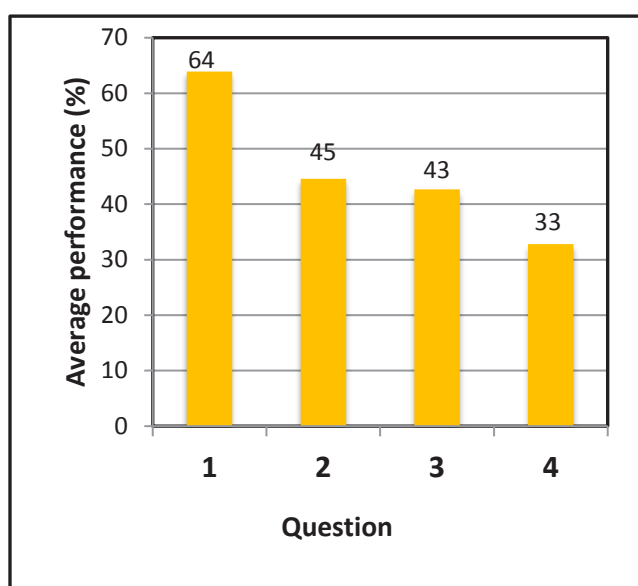
Q1	Multiple Choice, Terminology, Matching Items, Ovum & Sperm and the Brain
Q2	Meiosis, Reproduction and the Eye
Q3	Homeostasis, Endocrine System and Human Impact
Q4	Auxins and the Ear

Graph 8.3.2: Average Performance per Subquestion: Paper 1
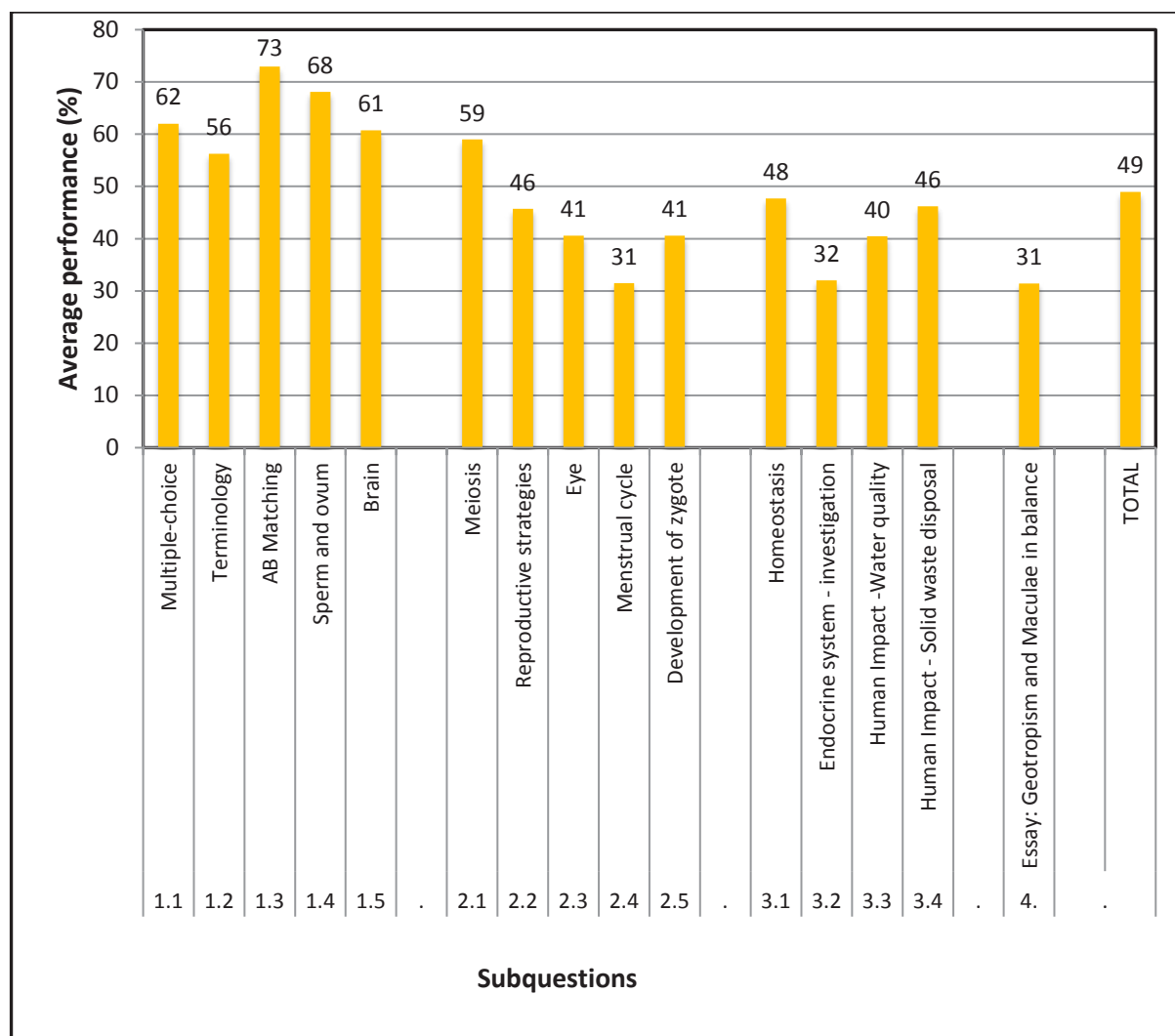
The worst performance by candidates was recorded in the subquestions on human reproduction, the endocrine system (based on an investigation), the eye and the essay on auxins and balance.

8.4 ANALYSIS OF LEARNER PERFORMANCE IN EACH QUESTION IN PAPER 1

QUESTION 1: MULTIPLE-CHOICE, TERMINOLOGY, MATCHING ITEMS, SPERM AND OVUM AND BRAIN

Common Errors and Misconceptions

(a)   In Q1.1 candidates lost marks since because they were unable to apply knowledge in multiple-choice items that assessed higher cognitive skills, such as in Q1.1.6 and Q1.1.10.

(b)   In Q1.2 biological terms remain problematic for many candidates. In this regard candidates:

- Gave the general term 'villi' in Q1.2.1 instead of 'chorionic villi' for the projections from the outer extra-embryonic membrane of the foetus. 'Villi' was not accepted as an answer since there are also villi in the small intestine and in the renal tubules of the kidney.
- Provided the term 'alien' or 'invasive' in Q1.2.3 when the required term was 'alien invasive'.
- Confused the term 'pregnancy' with 'gestation' in Q1.2.7.

(c)   In Q1.3 candidates were not able to differentiate between:

- The functions of the umbilical artery and umbilical vein
- Multiple sclerosis and Alzheimer's disease
- Greenhouse effect and carbon footprint

(d)   Many candidates lost marks in Q1.4 due to a lack of knowledge of the structure of the ovum and the sperm, despite this being stipulated as a requirement in the *Examination Guidelines*.

(e)   Poor performance in Q1.5 was due to candidates' inability to differentiate between:

- Corpus callosum and corpus luteum in Q1.5.1(b)
- Cerebrum and cerebellum in Q1.5.2(c)

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)   Descriptions given in the terminology question must be read carefully before providing an answer. The answer must be the most appropriate term for the description, e.g. Q1.2.3 asked for 'A plant species that does not belong to an area and which outcompetes the indigenous species of that area'.

(c)   'A plant species that does not belong to an area' is regarded as an *alien* plant but this does not constitute the full answer since the description goes on to describe the effect of the alien plant. When it 'outcompetes the indigenous species of that area' it is regarded as *invasive*. The full answer is therefore 'alien invasive'.

(d)   A concerted attempt should be made to differentiate between closely related terms, e.g. in Q1.2.7, the correct answer for the period of development of the foetus in the uterus is 'gestation' which spans from conception to birth as opposed to 'pregnancy' which refers to all changes (hormonal, physical, emotional) that take place in the body of a female as a result of the developing foetus.

(e)   Certain sections of work, especially those that involve structure and function (such as the male reproductive system in Q1.1.5/6, the sperm and ovum in Q1.4 and the brain in Q1.5) are best taught using diagrams.

(f)   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.

(g)   It is evident from Q1.3.2(b), a question involving multiple sclerosis and Alzheimer's disease, as well as later from Q2.3, a question on visual defects, that teachers are neglecting to focus on the disorders related to the different parts of the nervous system. More emphasis should be placed on these disorders together with appropriate corrective mechanisms.

QUESTION 2: MEIOSIS, REPRODUCTION AND THE EYE

Common Errors and Misconceptions

(a)   In Q2.1.2 many candidates were not able to correctly identify the phase 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 3 as anaphase I rather than anaphase II. This indicates that they are not aware of the differences between meiosis I and meiosis II. This was also evident in Q2.1.4 where candidates were unable to provide a difference between metaphase I and metaphase II.

An inability to identify the phases also impacted on performance in Q2.1.3 which required the diagrams to be organised into a correct sequence based on the phases represented.

(b)   Poor performance in Q2.1 was due to a lack of knowledge of basic terminology which was evident when candidates provided the answer:

- Centrosome instead of centromere in Q2.1.1(a)
- Bivalent instead of homologous chromosomes in Q2.1.1(b)

(c)   In Q.2.2.1 candidates provided an incomplete definition of the term 'ovovivipary' and hence lost both marks since a definition carries a double mark. A definition has to be precise. In this term, 'ovo' refers to the egg which in this case is retained and which hatches in the body of the female. 'Vivi' refers to the production of live offspring. Therefore a precise definition will be: A type of reproduction whereby the egg hatches within the body of the female such that the young are born live.

(d)   Candidates were unable to differentiate between precocial and altricial development in order to correctly answer Q2.2.2 and Q2.2.3.

(e)   Possible reasons for poor performance is Q2.3 are as follows:

- Insufficient knowledge of visual defects
- Inability to suggest corrective treatment for the different visual defects
- Inability to perform calculations on proportions for a pie-chart or in drawing the pie-chart
- Not showing the calculations for proportions in the answer book
- Lack of instruments (protractor and compass) for the drawing of the pie-chart

(f)   In Q2.4.1 candidates were not able to recognise that the question required a slight extension of the negative feedback between FSH and progesterone.

Poor performance could be attributed to a lack of knowledge of the hormones involved in the menstrual cycle. This question involved the action of three hormones: FSH, oestrogen and progesterone.

The description of the development of a zygote until implantation occurs was required in Q2.5. Despite this aspect being stipulated in the exam guideline and thus being lower order, many candidates provided an incomplete description or a description that was not in a logical sequence.

No credit was awarded when the description was provided in the form of a flow diagram. This is as per the instruction at the beginning of the question paper which states: Draw diagrams, tables or flowcharts only when asked to do so.

A description of fertilisation was not required as one was required to start with the zygote (an indication that fertilisation had already taken place). Other candidates included a description of the foetus which was not required since that occurs after implantation.

In the required description, many candidates spoke incorrectly about a blastocyte (a cell in the blastocyst) stage instead of a blastocyst stage (a stage consisting of a hollow ball of cells).

(g)   Candidates were not able to differentiate between the action verb *state* from the action verb *explain* in questions. Those who simply stated an answer correctly obtained 1 out of the 2 marks. An explanation consists of two parts, a statement and a substantiation of the statement and is thus credited with the full 2 marks. This is applicable to Q2.2.3 and Q2.3.2(a). Q2.3.3 and Q2.4.1 required a longer substantiation and was therefore allocated 4 marks each.

Suggestions for Improvement

(a)   Teachers should use strategies that will 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.

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(b) Questions on the drawing of diagrams representing different phases of meiosis have appeared in many past examination question papers. Teachers should collate 4 or 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 between closely related terms, for example:

Centrosome	Centromere
Structure that is responsible for the formation of spindle fibres during cell division in animal cells.	Structure that holds two chromatids together in a replicated chromosome and which also attaches the chromosome to the spindle thread during cell division.

Homologous chromosomes	Bivalent
Chromosomes that are identical in shape and size and which contain genes for the same set of characteristics.	Refers to homologous chromosomes only when they are involved in the process of crossing over. At this stage, they function as one unit, connected to each other. After crossing over is complete and the chromosomes are not connected anymore, the term bivalent cannot be used.

Altricial development	Precocial development
Development in birds that is incomplete such that the young are born helpless, with eyes closed, without down feathers and unable to move or feed independently.	Development in birds that is complete such that the young are born independent, with eyes open, with down feathers and able to move or feed independently.
The incomplete development is due to the small quantity of yolk in the egg which restricts the time available for full development.	The complete or maximum development is due to the large quantity of yolk in the egg which lasts longer, allowing more time for development.

(d) The section on disorders or defects, together with their corrective mechanisms related to the nervous system, must not be neglected by teachers. In the eye for example, learners are expected to know about cataracts, astigmatism, short-sightedness (myopia) and long-sightedness (hypermetropia).

(e) Regarding the drawing of pie-charts, learners must always:

- Show the calculations for proportion even if not asked for. It is expected that calculations should precede the drawing of a pie-chart.
- Be aware of the criteria that will be used to assess the pie-chart drawn.

(f) The negative feedback between FSH and progesterone must be taught well. In the answer, learners must state that '*high* levels of progesterone inhibit FSH production' and not just that 'progesterone inhibits FSH production'.

(g) Learners must know the names of hormones that play a role in the menstrual cycle, the glands that produce them and the function/s of each hormone. Learners should be asked to compile a table of the above, where the names of the hormones should appear in the sequence in which they play a role in the menstrual cycle. This will help learners in establishing the logical sequence of events in the menstrual cycle. The following template could be used for the table:

Gland	Hormone	Function/s
	FSH	
	Oestrogen	
	LH	
	Progesterone	

In addition to the above, learners should be able to identify the place on a diagram or graph on the menstrual cycle where the effect of each hormone is represented.

(h) Teachers should explicitly teach learners how to interpret questions. Some questions for example, may not require a complete account of a process. A careful reading of the question will provide clues as to where in the process one should begin and where to stop, or alternatively what to include and what to omit.

Q2.4.5, for example, required one to start with the zygote. The zygote is already a product of fertilisation so the process of fertilisation leading to the zygote was not required. Also, the question required one to stop at implantation. Since it is the blastocyst/blastula stage that implants, a description of foetal development which occurs after implantation was not required.

(i) The table below shows how answers in response to the action verb 'explain' should be phrased to be able to get the full credit of two marks.

Question in this paper	Statement	Reason/elaboration/substantiation
Q2.2.3	The egg has the highest yolk content✓	thus allowing for the full development of the chick before hatching✓
Q2.3.2(a)	The lens becomes opaque✓	preventing the passage of light through it✓

The answers in the examination paper are not required in table form. A table has been used here to highlight the two aspects required.

QUESTION 3: HOMEOSTASIS, ENDOCRINE SYSTEM AND HUMAN IMPACT

Common Errors and Misconceptions

(a)   In Q3.1.1(b) some candidates gave the answer as 'adrenalin' instead of 'aldosterone'.

(b)   Many candidates lacked the knowledge and understanding needed to explain the homeostatic mechanism for salt and water in a cause-effect way in Q 3.1.4.
Candidates:

- Referred to the 'high salt concentration' or 'low water concentration' in the body instead of the blood and therefore lost a mark.
- Did not mention that when 'less aldosterone' is secreted, 'less salt' will be reabsorbed into the blood.
- Did not mention that when 'more ADH' is secreted, 'more water' is reabsorbed into the blood.

(c)   In Q3.2.3 candidates could not differentiate between the factors that *were* kept constant as opposed to the factors that *should* have been kept constant during the investigation.

(d)   Some candidates failed to identify the independent variable in the investigation in Q3.2.2 as *adrenalin*.

(e)   In the answer to Q3.2.6 some candidates wrote about adrenalin stimulating the conversion of glucagon to glucose instead of the conversion of glycogen to glucose. They confused 'glucagon' with 'glycogen'.

(f)   Many candidates just gave the reason for using 100 patients as 'to ensure reliability' instead of 'to increase reliability' in Q3.2.7. Reliability has different degrees. Each improvement to the experimental design will increase the reliability of the results obtained.

(g)   Candidates often lost a mark in Q3.3.1 and Q3.3.2 since they formulated an answer which failed to give a direct response or conclusion to what was asked in the question.

For example, in Q3.3.1 the question asked about the how the dam 'affects biodiversity'. One compulsory mark was therefore allocated to the answer 'it decreases biodiversity.

Similarly, in Q3.3.2 which asked how fertilisers in the dam 'impact on water quality', one compulsory mark was therefore allocated to the answer 'it decreases water quality'.

(h)   In Q3.3.2 most candidates did not realise that an account on eutrophication was required. Further, many answers presented by candidates were not in a logical cause-effect sequence.

(i)   In Q3.3.3 candidates often gave benefits that were not 'economic' as required by the question and hence did not receive credit.

(j)   In Q3.4.2 the question asked about the 'impact of burning plastic on global warming'. One compulsory mark was therefore allocated to the answer, 'it increases global warming'.

In their answers, candidates were expected to write about an 'increase' in the amount of carbon dioxide (since carbon dioxide is always present in the air) and the 'enhanced greenhouse effect' (since the greenhouse effect is always there). All of this leads to an 'increase' in heat trapped.

(k)   In Q3.4.3 candidates gave strategies that 'individuals' could implement to increase the recycling of plastic, instead of what 'municipalities' could do.

Suggestions for Improvement

(a)   Flow diagrams are not acceptable when homeostatic mechanisms are required unless it is specifically asked for. Learners must therefore be taught how to convert information from a flow diagram into a paragraph as most homeostatic mechanisms in textbooks are shown as flow diagrams.

This paragraph must be written in a logical cause-effect sequence. Learners must be able to correctly name the hormones involved in the homeostatic control of water and salts as required by Q3.1.4 and whether there is an increase or decrease in the level of the hormones. Finally, they must conclude with the effects of the changing levels of the relevant hormones.

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 organs/s

Step 5:   The target organ responds

Step 6:   It opposes/reverses the imbalance

Step 7:   Balance is restored

(b)   Between Q3.1 and Q3.2, knowledge of 4 hormones (ADH, aldosterone, glucagon and adrenalin) and their functions as well as the glands that produce them was required.

It is therefore advisable for learners to draw a table containing information on the various endocrine glands, the hormones they secrete and the functions of each hormone, in preparation for questions on the endocrine system and on homeostasis.

(c)   When there are questions on validity or reliability, 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 validity or reliability.

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.

(d)   Teachers should ensure that the section on Human Impact on the Environment is properly taught and assessed in Grade 11 and thoroughly revised in Grade 12.

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(e)   Learners should be given practice in answering questions that require a response in paragraph form as was required for eutrophication in Q3.3.2.

As a first step in practising this skill using Q 3.3.2, learners could be asked to convert the flow account below containing key phrases in eutrophication into a paragraph form containing full sentences.

Fertilisers → algal bloom → block sunlight → no photosynthesis → plants die → animals die → increase in decomposers → oxygen decreases → water quality decreases.

Once the above has been done, learners should be asked to rewrite the paragraph without looking at the given phrases.

(f)   Learners should have greater exposure to questions based on information from extracts as these will better prepare them to answer questions based on Human Impact on the Environment.

QUESTION 4: ESSAY ON AUXINS AND THE EAR

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 gravity on the growth of the root and the stem
- Role of the maculae in maintaining balance

(b)   Candidates often lost the mark for:

- Relevance by including irrelevant information such as on phototropism to explain growth of the roots and stems when geotropism was required, as well as describing the role of cristae in balance when the role of the maculae was required.
- Logical sequence since they did not present information in a logical fashion. The information on the growth of the root and stem was mixed or the events leading to a change in the direction of growth of the stem and root was not provided in a cause-effect sequence. In other cases, the account on the role of the maculae in balance was also given in a mixed order.
- Comprehensiveness by answering only one aspect of the essay in detail or by answering both aspects but not in sufficient detail.

(c)   Many candidates wrote more on how the whole plant responded when exposed to gravity instead of how the roots and stems were specifically affected.

Candidates could not clearly differentiate between geotropism and phototropism. They have the misconception that geotropism only occurs in roots and phototropism only occurs in stems.

(d)   Some candidates did not know the difference between the parts of the ear which are responsible for hearing and those that are responsible for balance.

Other candidates had no knowledge of how balance is maintained by the maculae or they provided a full account of balance that also included the role of the semi-circular canals when this was not required by the question.

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 must be taught how to analyse a question to identify the sub-topics. In this essay for example, the first sub-topic required was on the role of auxins in geotropism. A careful reading of the question would have revealed that two clues pointed in the direction of geotropism:

First clue: The opening statement provided a scenario, 'Both plants and humans respond to *gravity'*.

Second clue: 'Plant received light from all directions' thus eliminating light as the independent variable since it was kept constant. It was *gravity* therefore that influenced the growth of the root and stem.

(e)   Teachers must emphasise that auxins:

- Have opposite effects in stems and roots.
- Either inhibit or stimulate growth in roots and stems depending on their concentration.
- Stimulates growth by stimulating cell division and cell elongation.
- Cause growth on both sides of the root and stem when the plant is horizontal and under the influence of gravity but growth is faster on one side as opposed to the other causing the root or stem to bend. It would be incorrect to say that one side grows and the other side does not grow.

(f)   Teachers should ensure that the topic on plant growth substances is taught thoroughly and that the prescribed practical work is done, as this will allow learners to develop a good understanding of this topic.

(g)   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
Semi-circular canals	Cristae	Changes in speed and direction
Sacculus and utriculus	Maculae	Changes in the position of the body

When a receptor is 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.

8.5   OVERVIEW OF LEARNER PERFORMANCE IN PAPER 2

General Comments

(a)   In general, candidates did not perform as well as expected in recall type questions. This is an indication that they are not learning basic terms, laws, principles and definitions.

(b)   Candidates performed well in questions requiring short answers, but performance was poor in questions requiring extended responses in the form of paragraphs and essays or in questions where answers had to be substantiated.

(c)   Many candidates had difficulties in the interpretation of tables, graphs, case studies and diagrams. They also found it challenging to correctly phrase their responses.

(d)   Many candidates still lack the skill of constructing a good essay.

(e)   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.

(f)   Candidates' performance indicates that they are still experiencing difficulty in certain aspects of meiosis, genetics and evolution.

(g)   Since textbooks do not always carry accurate information, teachers should always be guided by the *CAPS* and *Examination Guideline* documents for Life Sciences, e.g. many textbooks refer to DNA fingerprinting instead of DNA profiling.

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 in Paper 2
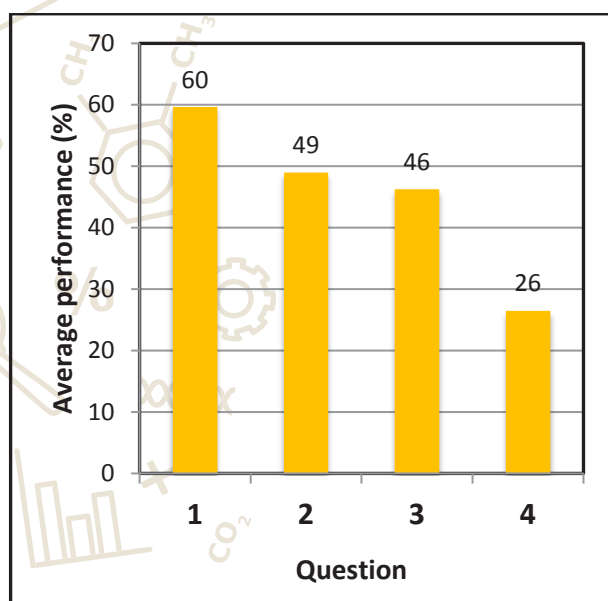
Q1	MCQ, Terms, AB Matching, Meiosis, Dihybrid cross
Q2	Protein Synthesis, Co-dominance, Monohybrid, Natural Selection, Scientific investigation
Q3	Human Evolution, Speciation, Variation
Q4	Sex Determination, Paternity Testing (Blood Groups and DNA Profiling)

Graph 8.6.2 Average Performance per Subquestion in Paper 2
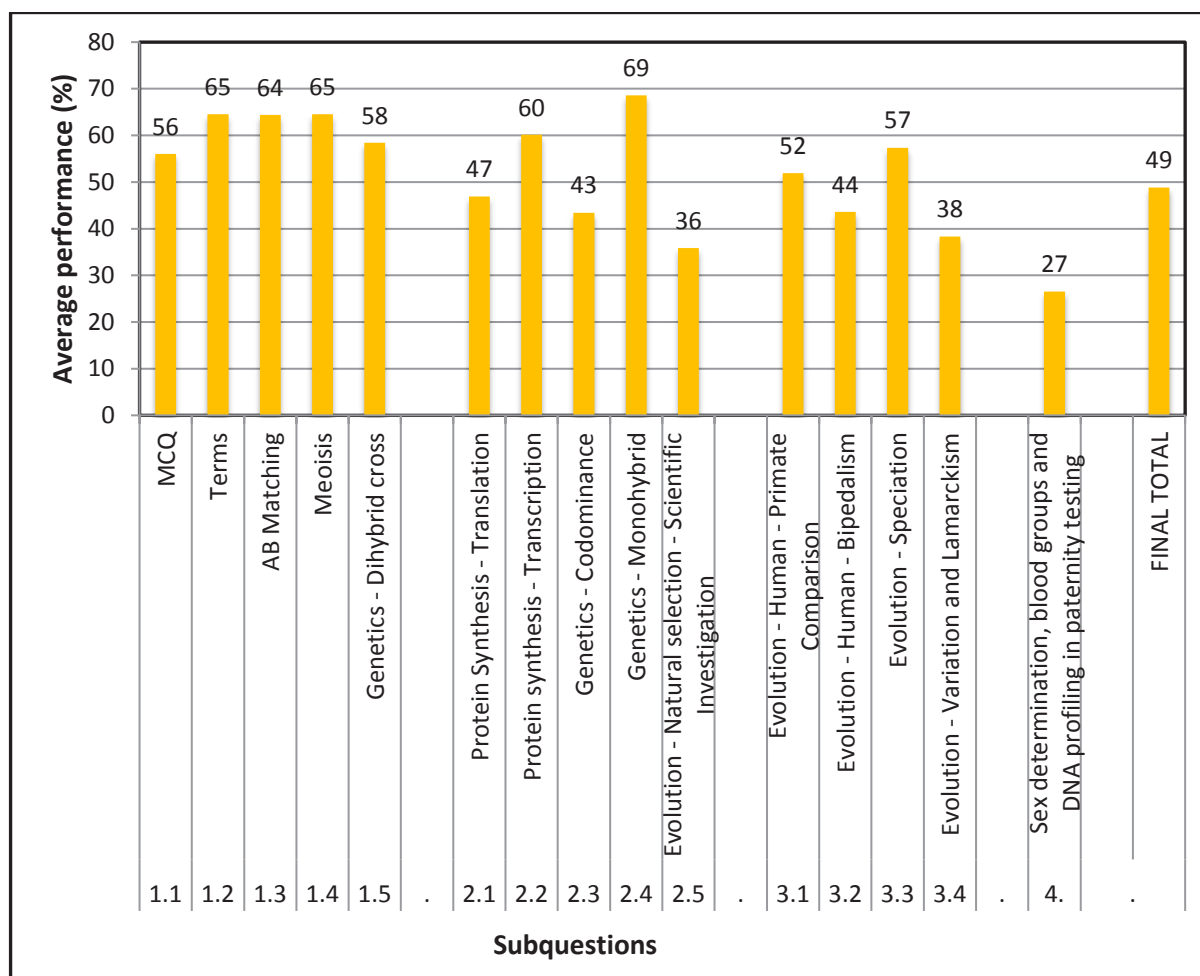
The worst performance by candidates was recorded in Q4 on sex determination and paternity testing, Q2.5 on the scientific investigation and natural selection and Q3.4 on variation and Lamarckism. The best performance was recorded in Q2.4 on the monohybrid crosses.

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 Q1.1.1 many candidates failed to select 'evolution' as the correct answer. Although the other options all relate to 'change over time', candidates were expected to choose the answer that best suited the description in the stem of the question.

(b)   In Q1.1.2, Q1.1.5 and Q1.1.7 where a range of combinations were given as options, candidates showed an inability to choose the correct combination.

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(c)   In Q1.1.3 most candidates could not perform the required calculation.

(d)   Many candidates could not apply the basic principles that were required to interpret the pedigree diagram in Q1.1.5.

(e)   Candidates confused 'biotechnology' with 'genetic modification' and 'genetic engineering' in Q1.2.8.

(f)   In Q1.4.1 some candidates could not differentiate between different terms, for example:

- Centromere and centriole/centrosome
- Nuclear membrane and cell membrane
- Chromosome and chromatid

(g)   In Q1.4.2 many candidates did not state whether a particular diagram was in phase I or phase II of meiosis.

(h)   In Q1.4.3(c) some candidates gave the number of chromosomes in a person with Down syndrome whereas the question required the number of chromosomes in the somatic cells of a 'normal mother' who has a son with Down syndrome.

(i)   In determining the genotypes of the parents in Q1.5.3(a) candidates wrote *Pp ; Ll* instead of *PpLl.*

(j)   Many candidates were not familiar with the concept of the 9.3.3.1 ratio obtained when heterozygous parents are involved in a dihybrid cross and could therefore not provide the correct number of offspring in Q1.5.3(b).

Suggestions for Improvement

(a)   There must 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. Poor spelling often changes the meaning of a term.

(c)   Teachers should differentiate between related terminologies, e.g. centromere and centriole/centrosome, nuclear membrane and cell membrane, chromosome and chromatid.

(d)   The events of the different phases of meiosis should be taught using annotated diagrams to clearly show what happens during each phase. Also, the importance of using the full names of the phases should be emphasised, e.g. prophase I instead of just prophase.

(e)   Teachers should provide learners with 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.

(f)   Teach learners to make their letters clear when writing genotypes. Capital letters should appear as capital letters and small letters should appear as small letters. Also emphasise that there should be no gaps or commas between the letters when writing a single genotype.

(g)   Teachers and learners should download the *JSDT Solution for Life Sciences* app from Playstore available for Grades 12 and 11 and which can be used to prepare for Section A.

QUESTION 2: PROTEIN SYNTHESIS, CO-DOMINANCE, MONOHYBRID CROSS AND NATURAL SELECTION

Common Errors and Misconceptions

(a)   Many candidates struggled with Q2.1 where they had to identify the anticodons and DNA base triplets for the next amino acid from information on the diagram.

(b)   In Q.2.2 some candidates confused 'DNA replication' with 'transcription'. They stated that the double helix unwinds instead of saying that the DNA double helix unwinds. Also, they mentioned free nucleotides are used without specifying that these were free mRNA nucleotides.

(c)   In Q2.3 candidates confused 'co-dominance' with 'incomplete dominance'. Many candidates could not identify and describe co-dominance and explained instead how the offspring inherited the two dominant alleles from their parents.

(d)   In Q2.4.2 the number of each phenotype was left out by candidates and they just spoke about 'spotted being more than the unspotted' instead of providing the complete answer as '150 spotted offspring and 50 offspring without spots'.

(e)   The majority of candidates had difficulty in answering Q2.5 which was based on a scientific investigation in evolution in the present times, focusing on the resistance of E. coli bacteria to antibiotics.

They lost marks because they were unable to:
• Identify the independent variable.
• Identify factors that should have been kept constant during the investigation.
• Identify the variables, e.g. they provided 'antibiotics' as the independent variable rather than the 'type of antibiotic'.

(f)   In Q2.5.6 many candidates gave a generic description of natural selection without contextualizing it. They also either mentioned variation without describing the variation as it applied to the bacteria in the question or they applied the wrong variation, e.g. variation in the antibiotics or the pigs. The marking guideline was applied very strictly and when candidates went wrong early in their explanation, e.g. if they identified the incorrect variation or did not mention the variation, they lost all the marks.

Suggestions for Improvement

(a)   Teachers must encourage learners to read questions carefully, noting what exactly is required of them. They should be taught what it means when the words *describe* and *explain* are used. They must also take note of the mark allocation for a question.

(b)   Teachers should guide learners in interpreting questions by using past examination question papers. For protein synthesis, learners must be exposed to questions based on interpretation of diagrams rather than memorising the process.

(c)   Learners must be taught how to differentiate between co-dominance and incomplete dominance.

(d)   Learners must have more exposure to scientific investigation questions from past examination papers.

(e)   Dependent and independent variables must be identified from the aim of an investigation and must be written in full.

(f)   Learners must be taught to pay attention to the tense of the question. If the question asks for factors that *were* kept constant, then these must be obtained from the text. If it asks for factors that *should* be kept constant, then these are new ones that the learners must come up with themselves.

(g)   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.

QUESTION 3: HUMAN EVOLUTION, SPECIATION, VARIATION AND LAMARCKISM

Common Errors and Misconceptions

(a)   In Q3.1.1, more and less prognathous was not credited as a difference since it should be stated as *prognathous* and *non-prognathous*.

Some candidates wrote on the brain size and position of the foramen magnum although these characteristics were not visible in the skulls.

(b)   In Q3.1.2 some candidates wrote 'long upper limbs' instead of 'long upper arms' and thereby lost marks as they were referring to the whole arm instead of just the upper part of the arm. Some candidates gave characteristics which were not specific to the upper arm, e.g. eyes in front.

(c)   Many candidates received credit for 'increased brain size' in Q3.1.3 but could not explain how this is related to intelligence. Instead they gave examples of intelligence such as creative thinking and language development.

(d)   In Q3.2.2 some candidates referred to 'bipedalism' as 'being able to walk on two limbs' without specifying that hind limbs or lower limbs are the ones that are used. They lost marks because arms are also limbs and are not used for walking in bipedalism.

(e)   Some candidates stated 'centre' or 'front' to indicate the position of the foramen magnum in Q3.2.2 (a) instead of a 'more forward position'.

(f)   In Q3.3 some candidates lost marks for structuring their description around a *species* instead of a *population* of a single species. Many candidates provided key words without any elaboration, e.g. 'geographical barrier', 'no gene flow' or 'natural selection occurs independently'.

(g)   In Q3.4.1 some candidates wrote about random assortment or random segregation instead of *random arrangement* of chromosomes.

(h)   Q 3.4.3 was poorly answered since many candidates could not recall Grade 10/11 work on red blood cells and haemoglobin.

(i)   In Q 3.4.4 many candidates could not apply Lamarck's theory to the information in the extract. Many answers referred to the mutant gene which is aligned to Darwinism and not to Lamarckism.

Suggestions for Improvement

(a)   Teachers must use the *Examination Guidelines of 2017* when teaching evolution and the guidelines must be made available to all learners.

(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.

(c)   The term 'observable' when referring to a given diagram should be clearly explained to learners so that they understand that only features that are visible in the diagram should be mentioned.

(d)   Examination techniques should be considered and taught to learners. For example, if asked for a comparison in a question, they must refer to both organisms given in the question in their answer. Learners must be taught to compare features directly, where the same feature is considered in a single row with just the difference in the feature given in both columns of that row in the table.

(e)   Teachers must ensure that learners know the changes in the position of the foramen magnum as being 'more forward' in humans and 'more backward' in the African apes. No other description like central, bottom, middle or base of the cranium is acceptable as these descriptions are relative and have different interpretations.

(f)   Teachers should emphasise the use of the phrase 'to allow the spinal cord to enter vertically' when explaining the significance of the more forward position of the foramen magnum in bipedalism. Learners must also know how the pelvis and the spine of humans and other primates contribute to bipedalism.

(g)   Teachers must ensure that learners are exposed to many questions involving extracts to train them in isolating only the relevant information and not just take sentences from the extract.

(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.

(i)   Independent and dependent variables should be identified from the aim of the investigation.

(j)   Teachers must ensure that learners know the difference between an 'organism', a 'species' and a 'population'.

(k)   The first step in applying Lamarck's theory involves differentiating between:

- An inherited characteristic – a characteristic that an offspring is born with, having been inherited from one of the parents; a characteristic controlled by a gene

- An acquired characteristic – a characteristic that an offspring is not born with but which develops/ is acquired through the course of its lifetime; a characteristic not controlled by a gene.

In Q3.4 the 'increased efficiency in using oxygen' is the inherited characteristic since it was indicated that it was caused by a mutant 'gene'.

The ability to 'produce more red blood cells' is the acquired characteristic since this characteristic evolved in response to altitude/an environmental factor.

Any application of Lamarck should therefore explain the 'production of more red blood cells' since this is the acquired characteristic and not the 'more efficient use of oxygen'.

Thereafter, the guiding questions in the first column of the table below can help formulate the required answer to the question, in the second column.

Guiding questions	Lamarck's explanation
What was the original characteristic?	Originally the Tibetans did not produce many red blood cells
What was the challenge?	There is a low oxygen content at high altitudes
What did the organism do/what characteristic was then acquired?	The body started producing more red blood cells (this is the acquired characteristic)
What was the result?	This helped the Tibetans to make better use of the little oxygen
What happened to this acquired characteristic?	This acquired characteristic of producing more red blood cells was passed on to the offspring
What was the result of this?	All Tibetans now produce more red blood cells allowing them to survive at high altitudes.

(l)   Learners should be exposed to many examples of applying Lamarck's and Darwin's theories.

QUESTION 4: SEX DETERMINATION, BLOOD GROUPING AND DNA PROFILING IN PATERNITY

Common Errors and Misconceptions

(a) Many candidates confused the subtopics and described karyotypes instead of sex determination, sex inheritance instead of paternity testing using blood grouping, and uses of DNA profiling instead of how DNA profiling is used in paternity testing.

(b) Most candidates gave much detail on the karyotype and autosomes instead of focusing on the gonosomes. Consequently, they lost marks for relevance.

(c) Some candidates confused sex determination with sex-linked disorders and therefore tried to describe sex determination using the X^h/X^H alleles or genotypes such as X^HY.

(d) Candidates stated that the DNA profile of the child must be compared with that of the possible father without mentioning the mother's DNA profile.

(e) Terminology was incorrectly used as candidates referred to 'genes' and not 'alleles'. Also, some wrote that profiles must be compared where it should be the 'bands' of the DNA profile that must be compared.

(f) A large number of candidates did not mention that the DNA bands of the mother and the child must be compared first, and the remaining bands must be compared with those of the possible father.

(g) Most candidates wrote several paragraphs about the alleles for blood type and the resulting possible outcomes of different blood types when this was not required.

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) 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. The essay in this paper required the following three aspects:

- Sex determination
- Use of blood grouping in determining paternity
- Use of DNA profiling in determining paternity

(c) The concepts sex determination and the use of blood grouping and DNA profiling in paternity testing should be thoroughly taught. Learners should also be given practice in writing a paragraph on each of these three concepts.

(d) Teachers should emphasise in blood grouping that the child receives an allele from the mother and an allele from the father. If the blood group of the mother and the possible father cannot lead to the blood group of the child, then the man is not the father. If it can lead to the blood group of the child, then the man might be the father but this is not conclusive as many men have the same blood group.

(e) Teachers must ensure that learners know the role of the mother during DNA profiling in paternity tests. Learners should start with the mother's bands that correlate with the child's bands and compare the remaining bands with the possible father's. This method is important during cases where babies are accidentally swopped in hospitals.

(f) 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.

(g) Teachers must refrain from using the term 'DNA fingerprinting' and rather use 'DNA profiling' as prescribed in the current examination guidelines.

(h) Teachers must use the *Mind the Gap* study guide to assist learners in the use of mind maps in the planning of an essay.

(i) Topics in the curriculum that are viewed as smaller content topics or subtopics of larger topics such as 'paternity' and 'sources of variation' (crossing over, random arrangement of chromosomes, random mating, random fertilisation and mutations) mentioned in the *Examination Guidelines* are seemingly ignored by some teachers. Teachers should teach every topic extensively to ensure that learners are well-prepared to answer any question on any topic.

(j) 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.

Chapter 9

MATHEMATICAL LITERACY

The following report should be read in conjunction with the Mathematical Literacy question papers of the November 2019 Examinations.

9.1   PERFORMANCE TRENDS (2015–2019)

The number of candidates who wrote the Mathematical Literacy examinations in 2019 increased by 4 403. The performance of candidates in the 2019 examinations was very impressive. Achievement at 30% and above increased substantially from 72,5% in 2018 to 80,6% and achievement at 40% and above was an impressive 54,5%, in comparison to 45,4% in 2018. Performance in 2019 is by far the best since 2015.

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
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
2019	298 607	240 816	80,6	162 877	54,5

Graph 9.1.1. Overall Achievement Rates in Mathematical Literacy (Percentage)

	2015	2016	2017	2018	2019
% achieved at 30% and above	71.4	71.3	73.9	72.5	80.6
% achieved at 40% and above	44.3	46.4	45.0	45.4	54.5
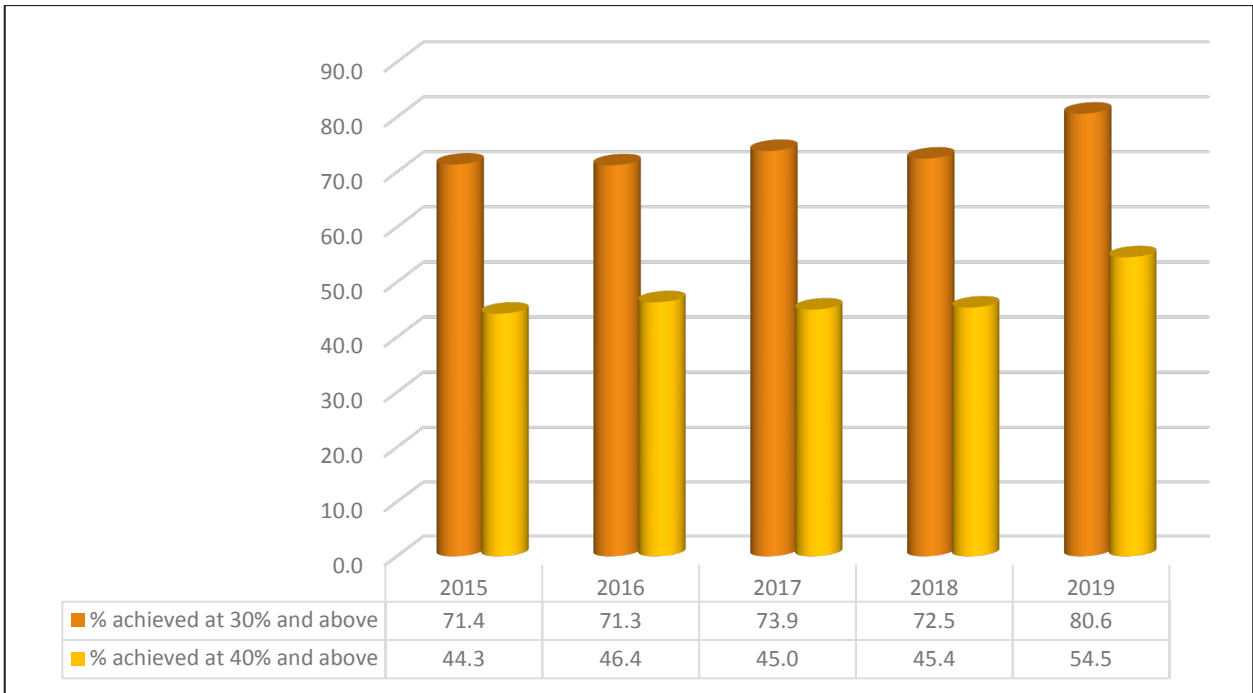
Graph 9.1.2 Performance Distribution Curves in Mathematical Literacy (Percentage)

	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
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
2019	0.2	4.0	15.2	26.1	22.2	15.5	9.5	5.1	1.9	0.2
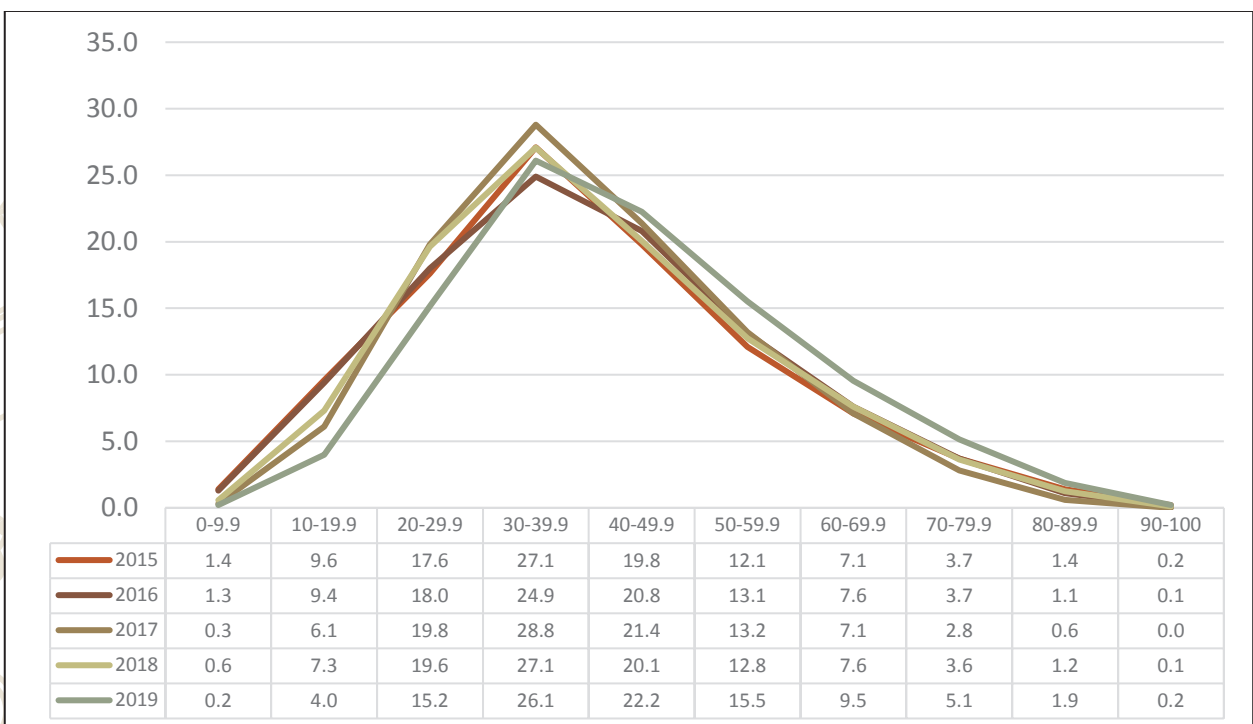
9.2   GENERAL COMMENTS ON PAPER 1 AND PAPER 2

(a)   **Terminology:** Learners should be taught the definitions of commonly used terms in Mathematical Literacy such as 'volume' and 'perimeter'. Learners should compile a topic-wise glossary of terms at the back of their notebooks with a brief but clear definition next to each term. A separate notebook may also be kept for this purpose. By the end of the 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 subquestion. Tables are often used to reduce written text.

(c)   **Use past NSC papers:** Firstly, it must be noted that past examination 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*. Teachers can adapt certain questions for use in class, especially those that include working with large numbers. Secondly, teachers should ensure that learners revise questions that define mathematical terms, especially in a given 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 provides them with immediate feedback and 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 the *CAPS*, such as *personal income tax* and *box-and-whisker plots*.

(e)   **Previous recommendations:** Teachers should consult 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 2019 question paper was set according to the new guideline document. Consequently, Q1 was based entirely on short contexts, with all questions pitched at level 1.

(b)   Teachers are advised to use the Mathematical Literacy Paper 1 from June 2017 to date to prepare for the 2020 examination.

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.

Graph 9.3.1 Average Percentage Performance per Question for Paper 1
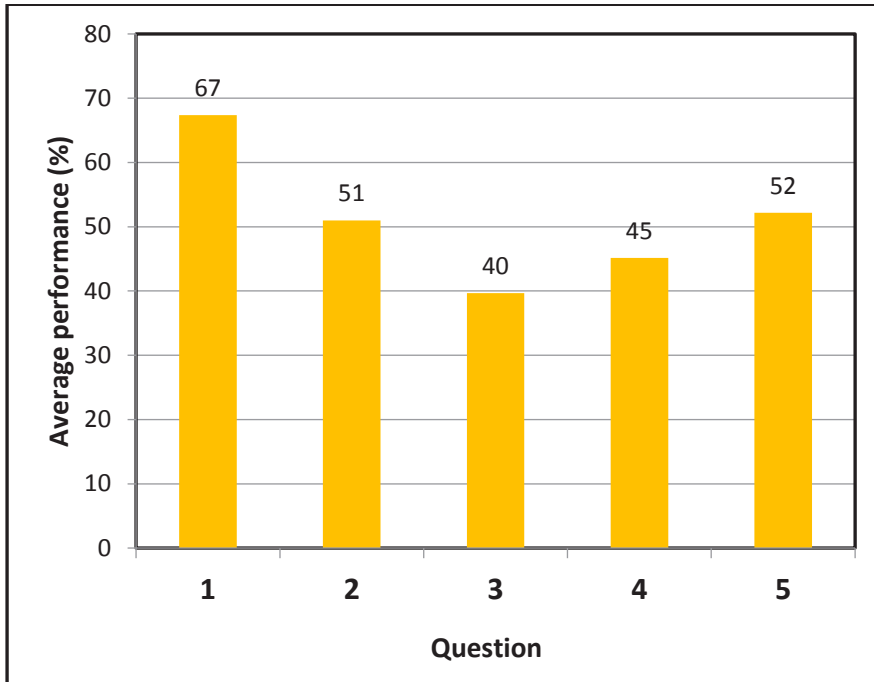
Q	Content
Q1	Short contexts
Q2	Finance
Q3	Measurement
Q4	Maps and Plans
Q5	Data Handling

Graph 9.3.1 Average Percentage Performance per Question for Paper 1
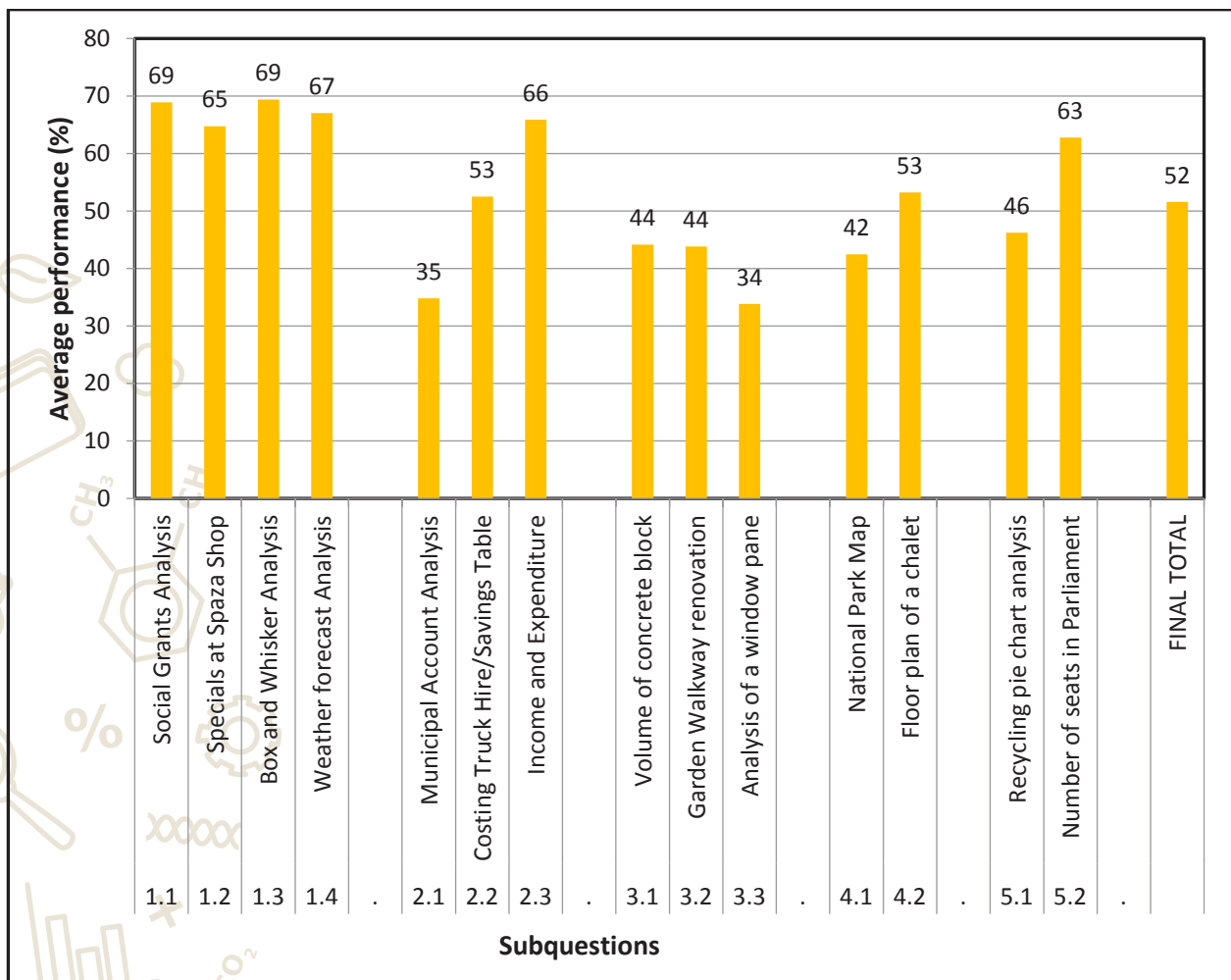
9.4 ANALYSIS OF LEARNER PERFORMANCE IN INDIVIDUAL QUESTIONS IN PAPER 1

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 2019.

QUESTION 1: SHORT CONTEXTS (INTEGRATED LEVEL 1 QUESTIONS ONLY)

Candidates performed well in this question except for Q1.1.1 which most learners misunderstood.

Common Errors and Misconceptions

(a)   Most candidates incorrectly chose 'categorical data' as an answer in Q1.1.1.

(b)   In Q1.1.3 some candidates used the wrong table to answer the question while others wrote the information in ascending order instead of descending order. These candidates lost one mark.

(c)   In Q1.1.4 some candidates could identify the two values but failed to find the difference between them. Hence, candidates were unable to determine the increase in disability allowances.

(d)   In Q1.1.5 some candidates listed more than two types of allowances and they were penalised for adding one or more extra incorrect allowances.

(e)   Many candidates had difficulty in converting grams to kilograms in Q1.2.1.

(f)   In Q1.2.2 some candidates wrongly added cash price to the selling price instead of subtracting the cash price from the selling price. This indicated that candidates have a lack of understanding of the term 'profit'.

(g)   The difference between analogue and digital formats of writing time was a challenge to many candidates in Q1.4.1.

(h)   In Q1.4.2 probability remains a challenge as many candidates could not write down the required answer of 20%.

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)   Teachers are advised to include questions on the definition of terms in their daily lessons and SBA tasks to ensure that learners are familiar with Mathematical Literacy terminology in all application topics.

(c)   Teachers should not assume that learners have mastered the skill of converting units of measurement in the lower grades. Converting units of measurement within the metric system should be practised by learners on a regular basis during contact time.

(d)   Learners should be taught how to express time values in different time formats. Time measurement and the difference between formats should be thoroughly revised in Grade 12. Teachers should use an analogue watch and a digital watch to demonstrate time formats.

(e)   Mathematical terms like *ascending* and *descending* should be displayed on wall charts in the classroom. Informal assessment tasks must include the testing of elementary mathematical terms.

QUESTION 2: FINANCE

The performance of candidates in this question was satisfactory and showed an improvement on the 2018 results.

Common Errors and Misconceptions

(a)   In Q2.1 most candidates rounded off their answers incorrectly. Candidates could not calculate the water tariff using the stepped/block tariff system.

(b)   Most candidates wrote kl instead of litre as the unit of measure in Q2.1.3.

(c)   In Q2.1.5 candidates just added the rates: R8,28 + R8,79 + R15 = R32,07 from the table instead of multiplying the units used in each step with the rate of that step. This showed a lack of knowledge on how to calculate charges using step tariffs.

(d)   Many candidates could not identify the graph as an inverse proportion graph in Q2.2.

(e)   In Q2.2.4(c) many candidates multiplied the rate by months, e.g. 17000 × 36 × 8,3/100 = R50 796. Some candidates did not round off their answers as instructed. Others did not know that our currency has two decimal digits. Some candidates multiplied incorrect accumulated amounts with the correct interest rate. Some candidates calculated correctly but failed to round off to the nearest R100. Some candidates used a compounding method or compound interest formula which is not *CAPS* aligned.

(f)   In Q2.2.4(d) some candidates used other incorrect values in the table, e.g. 9,00% - 8,08% = 0,92%.

(g)   In Q2.3.1 candidates were unable to use millions/billions correctly and wrote R2 427 as a final answer instead of R242 700 million.

Suggestions for Improvement

(a)   Teachers should focus on concepts related to VAT calculations, i.e. calculating the amount of VAT charged, on prices excluding VAT and on prices including VAT. They should also focus on rounding within the context.

(b)   Learners should be exposed to tariff systems of different municipalities and/or authentic contexts in which cost calculations are done, e.g. sewerage cost, electricity cost and water cost. These are real-life contexts and are used currently. Many textbooks only expose learners to linear systems and this is misleading.

(c)   Learners should clearly understand the difference between the interest rate values and interest values.

(d)   Teachers should enhance learners' skills of interpreting and filtering the information given in the question so that they will be able to select the information to be used in calculations.

(e)   Learners should be exposed to all the financial documents that are listed in the *CAPS* document.

QUESTION 3: MEASUREMENT (VOLUME; AREA; PERIMETER; CONVERSIONS)

There was a decline in the performance of the candidates in this topic in the 2019 examination.

Common Errors and Misconceptions

(a)   In Q3.1.1 candidates with a language barrier struggled to express the definition of *volume* in their own words.

(b)   In Q3.2 the conversion of units was problematic. Many candidates did not realise that all the dimensions must be in the same units before substitution into the formulae. Some candidates used the area of the walkway instead of the area of the blocks. Some candidates could not associate the diagram in the question paper with diagrams in ANNEXURE B.

(c)   In Q3.2.3 candidates did not know when to multiply or when to divide. Some candidates swapped the numerator and denominator. Some candidates wrote the correct fraction but then multiplied it by twenty. Most candidates did not contextualize the answer by rounding up their answers.

(d)   In Q3.3.3 some candidates struggled to determine the diameter. Furthermore, some candidates used the radius instead of the diameter. Some candidates used the dimensions of the large window and divided by the radius instead of the diameter.

(e)   In Q3.3.4 many candidates did not double the width of the window pane and they did not multiply by the inverse of the given ratio. Candidates only multiplied 37 by the width of one large window. Some candidates multiplied the radius by 2 and did not carry on. Some candidates used any values in the picture. Candidates could not multiply by the inverse of ¾ .

Suggestions for Improvement

(a)   Teachers must 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)   Mathematical terms such as *radius* and *diameter* must be reinforced on a regular basis. Learners must be taught how to differentiate between the radius and the diameter and which one (radius or diameter) to apply in the calculation for a particular context.

(c)   Teachers must expose learners to the glossary of terminology, especially at the introduction of the lessons.

(d)   Learners should be taught that rounding values will be determined by the context in which the rounding occurs.

QUESTION 4: MAPS AND PLANS

Candidates' performance in this question was satisfactory. This reflected an improvement in comparison to previous years' performances.

Common Errors and Misconceptions

(a)   Most candidates did not read Q4.1.1 correctly. The question asked for the activities represented by the symbols given on the map. The candidates named the symbols on the map and not the activities.

(b)   In Q4.1.5 candidates did not measure the bar graph to obtain the correct scale factor in order to calculate the actual distance.

(c)   Many candidates only used the distance one-way and not the return distance in Q4.1.6. Some candidates divided by 60 instead of multiplying by 60 to convert hours to minutes.

(d)   In Q4.2.2 some candidates failed to read the floor plan with understanding and as a result failed to interpret the compass directions in the context of the given plan.

(e)   Some candidates used all the rooms on the plan in Q4.2.3. Some candidates wrote the answer as a ratio. Most candidates could not recall that probability is expressed using a scale that ranges from 0 (impossible events) to 1 (events that are certain to take place).

Suggestions for Improvement

(a)   Learners need more practice in questions involving general directions and questions on a given set of directions. The interpretation of compass directions in the context of appropriate maps and plans must be taught in Grade 12.

(b)   Teachers should note that when a scale is given there is every chance that some actual measurement will be required. Therefore, learners should be afforded the opportunity to use their rulers in class on a regular basis to measure classroom items such as books, pens and pencils. Scale should be taught well to enable learners to interpret and make sense of maps and plans.

(c)   Teaching should also enhance the understanding of symbols and notations used on plans.

(d)   Time conversions must be given special attention in class or in intervention programmes. Learners should be able to convert units of measurement of time from memory, e.g. 12 months = 1 year.

QUESTION 5: DATA HANDLING

This question required candidates to interpret data in tables with large numbers.

Common Errors and Misconceptions

(a)   In Q5.1.3 candidates did not subtract from 11,2%, instead they subtracted from 100%.

(b)   Many candidates left out the word 'millions' or did not put in the corresponding number of zeros in Q5.1.4.

(c)   In Q5.1.7 candidates struggled to determine the probability.

Suggestions for Improvement

(a)   Teachers must place emphasis on the theory of data handling.

(b)   Teachers should teach learners to read, select and analyse data presented in different types of graphs in order to answer questions relating to the data. Emphasis should be placed on exposing learners to exercises of one pie chart drawn from a sector of another pie chart.

(c)   Learners should be exposed to writing out big numbers (hundred thousands, millions and billions) and doing calculations with percentages.

(d)   Emphasis should be on:
- The order of the ratio based on the question
- The difference between simplified form and unit form
- Simplification of a ratio proportionally

(e)   Teachers should emphasise the difference between a *histogram* and a *bar graph* and plotting points correctly on the graph.

9.5 OVERVIEW OF LEARNER PERFORMANCE IN PAPER 2

General Comment

The performances of candidates were similar to those recorded in the past.

9.6 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.

Graph 9.6.1 Average Percentage Performance per Question for Paper 2
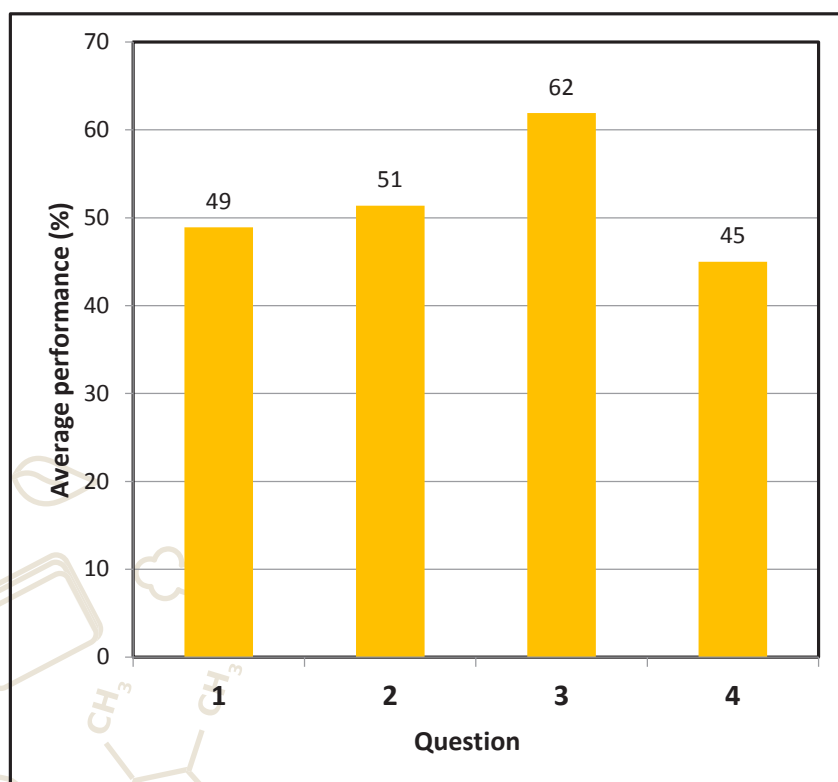
Q	Content
Q1	Maps Scale, Measurement and Finance
Q2	Data Handling and Finance
Q3	Finance, Data Handling and Assembly diagrams
Q4	Data Handling, Probabilty and Finance

Graph 9.6.2 Average Percentage Performance per Subquestion for Paper 2
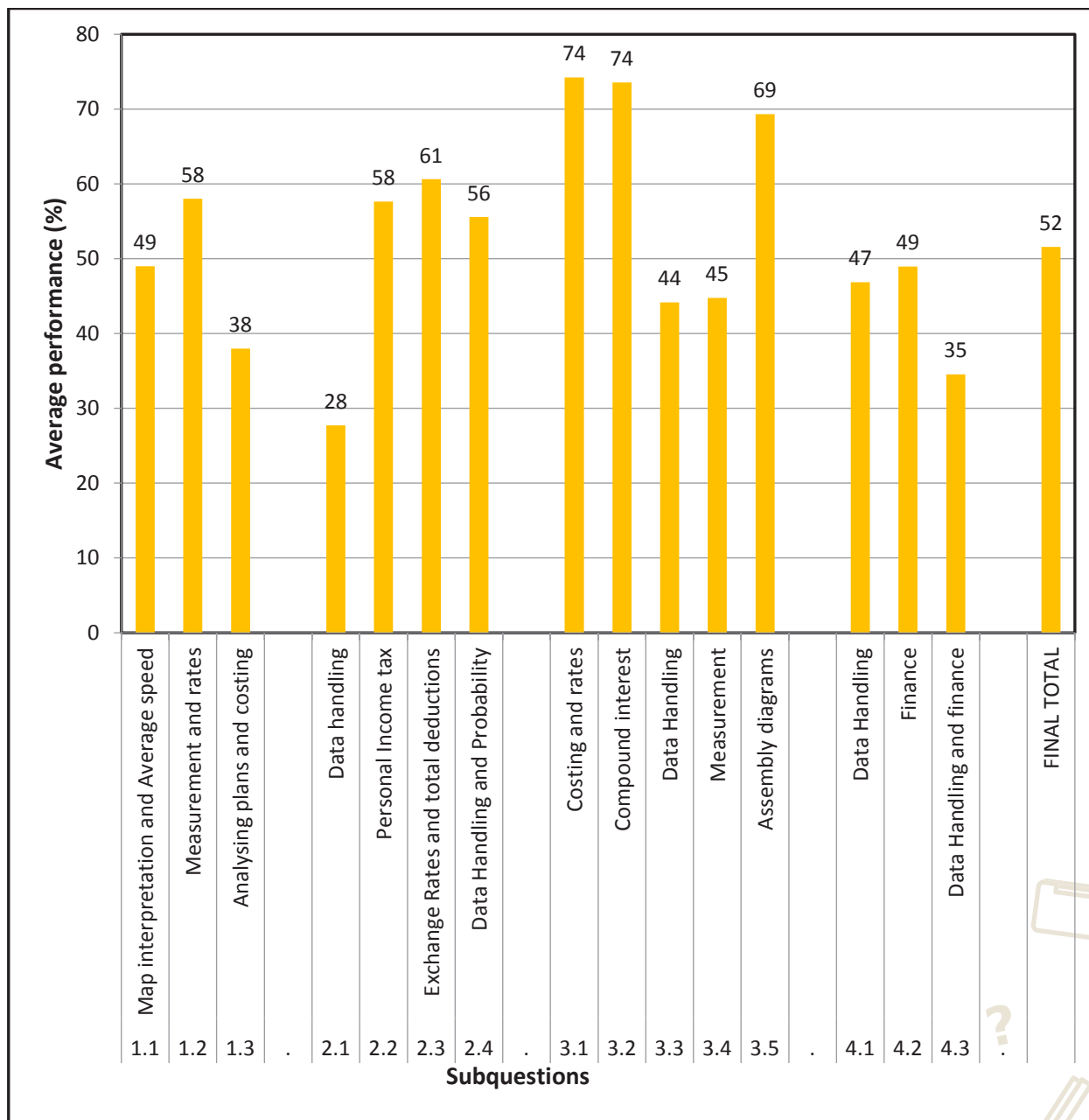
9.7 ANALYSIS OF LEARNER PERFORMANCE IN INDIVIDUAL QUESTIONS IN PAPER 2

QUESTION 1: MAPS AND PLANS; MEASUREMENT

Common Errors and Misconceptions

(a)   In Q1.1.1 some candidates used perception rather than the actual distance to identify the two towns closest to Nampo Park. On the map, Viljoenskroon looks further from Nampo Park than Klerksdorp. However, Viljoenskroon is 45 km from Nampo Park, and is closer than Klerksdorp.

(b) In Q1.1.2 most candidates could only give one of the correct directions. Many candidates did not understand the concept of compass direction and instead explained the route from OR Tambo Airport to Bultfontein.

(c) Many candidates, in Q1.1.3, did not take note of the key to the map. Instead, they incorrectly used their own routes to arrive at an answer.

(d) In Q1.1.4 most candidates struggled to write 8 pm in digital format and hence could not calculate the elapsed time. Some candidates were not aware that the time used in the formula represents time in hours only. Most candidates struggled to make time the subject of the formula. Many candidates could not convert a fraction of an hour into minutes.

(e) In Q1.2.1 many candidates did not convert the given measurements to the same unit. Other candidates calculated the volume of the trough but did not go on to subtract the capacity of the water.

(f) In Q1.2.3 many candidates did not understand the concept of 'half empty' and hence, they did not divide by two.

(g) Most candidates did not recognise that the dimensions of the small block were 1 m in Q1.3 and hence could not use the plan correctly.

(h) In Q1.3.2 many candidates did not determine the distance from stand 10 to 17 on the given floor plan. Some candidates only measured the distance on paper and did not relate it to the actual measurement of 36,5 m. Many of them could not convert the scale into a ratio.

(i) Most candidates did not use the correct dimensions for stand 26 in Q1.3.3 and did not divide by 16 to find the cost of 1 square metre.

Suggestions for Improvement

(a) Learners should be exposed to various types of maps, plans and other representations.

(b) Directions should be taught using practical examples and learners should be taught how to read different directions when travelling between two places.

(c) Learners should be taught that before calculating perimeter, area, volume or surface area, the units of the dimensions should be the same. If the dimensions are given in different units then they must first be converted to the same units.

(d) Learners should be taught how to convert parts of an hour to minutes and vice versa.

(e) Learners should be exposed to scenarios in which they work with time. They should be able to add and subtract time, using hours and minutes and a combination of both.

(f) Teachers should refrain from using the compound interest formula as the compound interest formula is not listed in the Mathematical Literacy *CAPS* document.

QUESTION 2: DATA ANALYSIS AND FINANCE

Common Errors and Misconceptions

(a)   In Q2.1.1 many candidates struggled to differentiate between numbers and money. Many of them failed to convert the R287,24 billion into a full monetary value. The calculation of the mean was a further challenge for many, particularly when the mean is given and either the numerator or denominator needs to be calculated. Many candidates used the information that the millionaires earn between

R1 and R2 million a year, instead of using the formula: $\dfrac{\text{Total income}}{\text{Number of millionaires}}$

(b)   In Q2.1.2 some candidates failed to see that R148 266 was 1005.0065% of the previous year, instead they used it as 100%. As a result, most of them calculated 5% of R148 266 and thereafter subtracted this amount from R148 266 as if the question was about percentage decrease.

(c)   Some candidates misunderstood or disregarded the fact that the medical aid amount in Q2.2.1 was given as monthly and therefore should be converted to annually.

(d)   In Q2.2.2 many candidates disregarded the age of the person and only subtracted one rebate. In a few cases, candidates used the wrong tax bracket and were penalised. In other cases it was obvious that candidates could not answer the tax rebate question.

(e)   Most learners struggled with conversions of currencies in Q2.3.1. As such, they could not make the correct decision. Conversion from Danish Kr to ZAR was done incorrectly. Early rounding resulted in candidates being penalized.

(f)   In Q2.3.2 most candidates did not calculate the total deductions but only used the employment deduction to calculate the percentage of annual deductions.

(g)   In Q2.4.2 some candidates assumed that G20 consists of 20 countries instead of 23 as shown in the table. The rounding to three decimal places was also a problem.

(h)   Some candidates did not understand the concept of quartiles in Q2.4.3(b) and some interchanged the 1st and 3rd quartile.

Suggestions for Improvement

(a)   Teachers should give learners practice on how to write down large numbers, like billions, fully.

(b)   Learners should be exposed to questions involving two or more formulae.

(c)   Teachers should reinforce that the concept of using VAT inclusive to find the VAT exclusive price can translate to other problems where a previous value is required.

(d)   Teachers should stay informed about the latest developments in terms of individual taxes and rectify information in textbooks that are outdated.

(e) Learners should be taught the different concepts of measures of spread and measures of central tendencies.

(f) Teachers should find a way to motivate learners to read the question again after answering the question in order to make sure that the correct rounding or verification was done.

QUESTION 3: MAP ANALYSIS; MEASUREMENT; LAYOUT ANALYSIS

Common Errors and Misconceptions

(a) Some candidates only determined the hourly rate in Q3.1.1 and did not go on to determine the rate per minute to answer the question.

(b) In Q3.1.2 some candidates could not determine whether the amount given was full or as a rate. Hence for 18 hours solo flying at a cost of R31 050, candidates multiplied these values which was not needed. They also multiplied the 700 by 2 which was also not needed. For the cost of the theory lessons they multiplied by 3 instead of 5. Other candidates were confused by two durations attached to one rate, for example, 15 hours of theory lessons costing R1 242 per 3-hour lesson.

(c) Many candidates still used the compound interest formula in Q3.2. Some candidates were able to find the balance at the end of the first year but used the original value (principal amount) in the calculations for the second year.

(d) In Q3.3.1 some candidates could not provide a reason as to why more candidates passed at the second attempt.

(e) Most candidates struggled with Q3.3.2 because the row and columns in TABLE 2 were switched in TABLE 3. Many candidates could not work with proportions involving percentages. Some candidates correctly calculated the missing values A, B C and D but then failed to calculate the total number of students who passed the test.

(f) In Q3.4 many candidates could not convert hours into weeks, days and hours. Some candidates divided 154 weeks by 7 days instead of multiplying by 7 days.

(g) In Q3.5.1 some candidates only considered the benches parts (4) as the correct answer.

Suggestions for Improvement

(a) Learners should be given guidance on how to analyse given information.

(b) Teachers should not teach the compound interest formula, but rather the step by step solution.

(c) Teachers should include Level 4 questions during their lessons and have assessments that include Level 4 questions. This will give learners confidence in approaching similar Level 4 questions in an examination.

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(d)   Teachers should emphasise the use of proportions as a skill in solving problems in various contexts. Teachers should reinforce time calculations and conversions of time into days, hours and minutes. The emphasis should also be on working out a part of a time period.

(e)   Assembly of structures as prescribed in *CAPS* should be emphasised as an integral part of Maps, Plans and Other Representations.

QUESTION 4: DATA ANALYSIS AND FINANCE

Common Errors and Misconceptions

(a)   In Q4.1.1 some candidates substituted the incorrect denominator, writing $\dfrac{14{,}5 \text{ million} - 10{,}8 \text{ million}}{14{,}5 \text{ million}}$ X 100 instead of $\dfrac{14{,}5 \text{ million} - 10{,}8 \text{ million}}{10{,}8 \text{ million}}$ X 100 Other candidates did not write the final answer as a percentage.

(b)   Some candidates selected the incorrect data in Q4.1.3, or they did not understand what was expected in the question.

(c)   In Q4.1.4 many candidates did not recognise that the effect of rounding could result in percentages not adding up to 100%, especially when dealing with large denominators.

(d)   Many candidates used the number of household sizes as the total outcomes in Q4.1.5 and incorrectly concluded that the probability was instead of summing the given probabilities. Many candidates used the wrong column from the given data.

(e)   Most candidates scored 1 mark only in Q4.2.1 because they did not write the range of the class. They only wrote R20 instead of R20 – R79.

(f)   In Q4.2.2 some candidates wrote the total without the word million or in an expanded form. These candidates lost one mark.

(g)   Most candidates could not find the correct household size in Q4.2.3 because they did not read the NOTE given in the key information (they rounded the household size to 4 instead of using 3,5). Many candidates did not know how many days there are in one year.

(h)   In Q4.2.4 many candidates only found 4% of 280 and multiplied by the number of months in a year instead of the number of days in a year.

(i)   In Q4.3.1 most candidates who gave a wrong answer (incorrect name), did not state that the name they gave as their answer was correct (in terms of the question), implying that the candidates did not check their calculations.

(j)   In Q4.3.2 most candidates calculated incorrectly 85% of R125 + 73% of R98 instead of (12,2 million × R125) + (10,6 million × R98). Other candidates did not multiply by 12 to arrive at the annual amount spent.

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(k)   Many candidates referred to the percentages that differ in Q4.3.3, instead of referring to the scale used on the vertical axis as the reason why the graphs appeared different.

Suggestions for Improvement

(a)   Teachers should encourage learners to first make sense of the information before attempting the questions.

(b)   Learners must be made aware that not all formulae will be given, and therefore they should know the formula for percentage change.

(c)   Teachers should emphasise that in all verification questions, learners must provide calculations to justify their answers.

(d)   Teachers should explain the concept of rounding (off versus down or up) and the effects of rounding.

(e)   Teachers should inform candidates that if the data is given in percentages, then it immediately represents probability.

(f)   Learners should be taught how scales have an impact on the appearance of graphs, i.e. that the graphs of the same data will appear to be different when different scales are used.

Chapter 10

MATHEMATICS

The following should be read in conjunction with the Mathematics question papers of the November 2019 Examinations.

10.1 PERFORMANCE TRENDS (2015–2019)

The number of candidates who wrote the Mathematics examination in 2019 decreased by 11 824 in comparison to that of 2018. The performance of the candidates in 2019 showed a noticeable decline at the 30% level from 58,0% in 2018 to 54,6% and a slight decline at the 40% level from 37,1% in 2018 to 35,0%.

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
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
2019	222 034	121 179	54,6	77 751	35,0

Performance in the 2019 examination showed deficiency in the understanding of basic concepts across some topics in the curriculum hence the decline in performance, both at the 30% and the 40% level of achievement. It appears that candidates are becoming over-reliant on past examination papers. While past examination papers may serve as a valuable resource for revision, the teaching and learning of basic concepts cannot and should not be overlooked. It was pleasing to note that the candidates' answering of routine questions in Euclidean Geometry shows continuous improvement.

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 questions across all topics in the curriculum, starting in the earlier grades.

Graph 10.1.1: Overall Achievement Rates in Mathematics (Percentage)

	2015	2016	2017	2018	2019
% achieved at 30% and above	49.1	51.1	51.9	58.0	54.6
% achieved at 40% and above	31.9	33.5	35.1	37.1	35.0
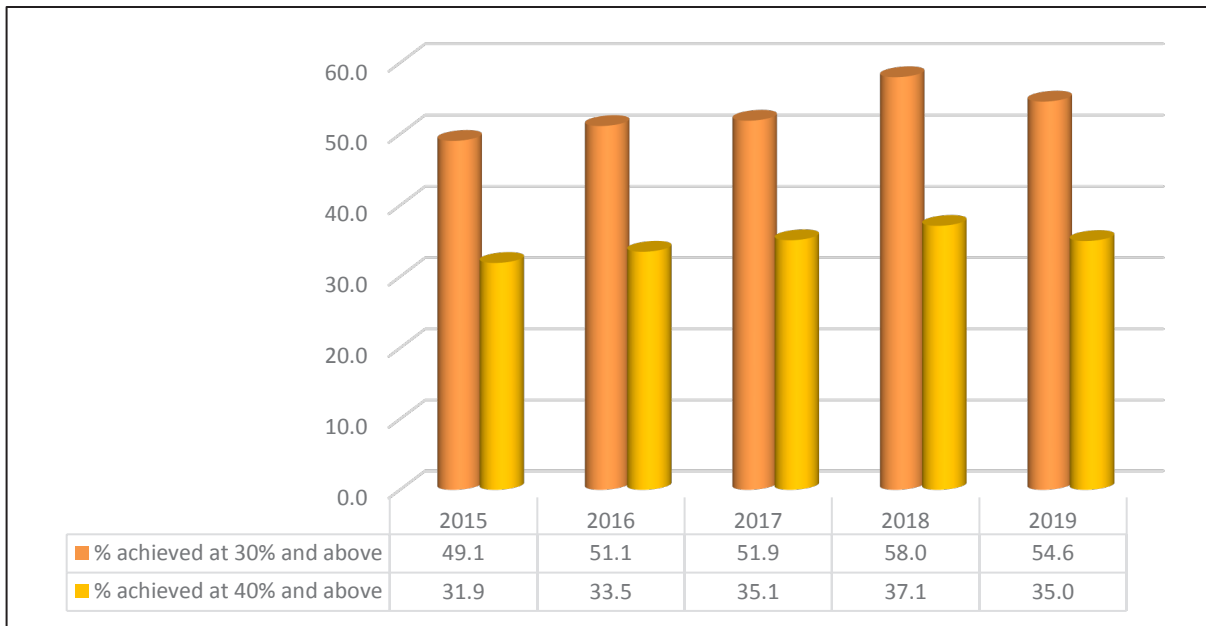
Graph 10.1.2: Performance Distribution Curves in Mathematics (Percentage)

|	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
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
2019	9.2	17.2	19.0	19.6	14.7	9.6	5.6	3.1	1.5	0.4
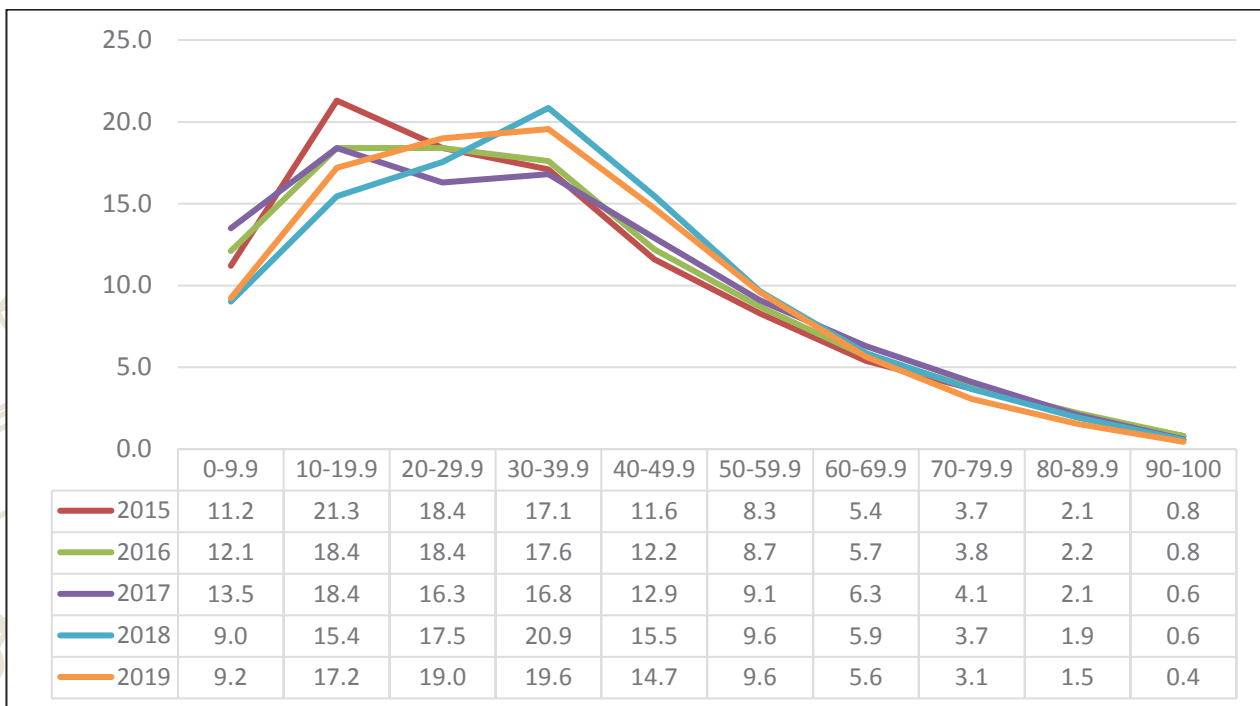
10.2 OVERVIEW OF LEARNER PERFORMANCE IN PAPER 1

(a)   Many candidates were able to answer the routine questions correctly and scored some marks in a majority of the questions. This suggests that the candidates were well prepared to deal with the knowledge and routine questions in the paper.

(b)   The algebraic skills of the candidates are poor. Most candidates lacked fundamental and basic mathematical competencies which should have been acquired in the lower grades. This becomes an impediment to candidates answering complex questions correctly.

(c)   While calculations and performing well-known routine procedures form the basis of answering questions in a Mathematics paper, a deeper understanding of definitions and concepts cannot be overlooked. Candidates did not fare well in answering questions that assessed an understanding of concepts.

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.

Graph 10.3.1 Average Percentage Performance per Question for Paper 1
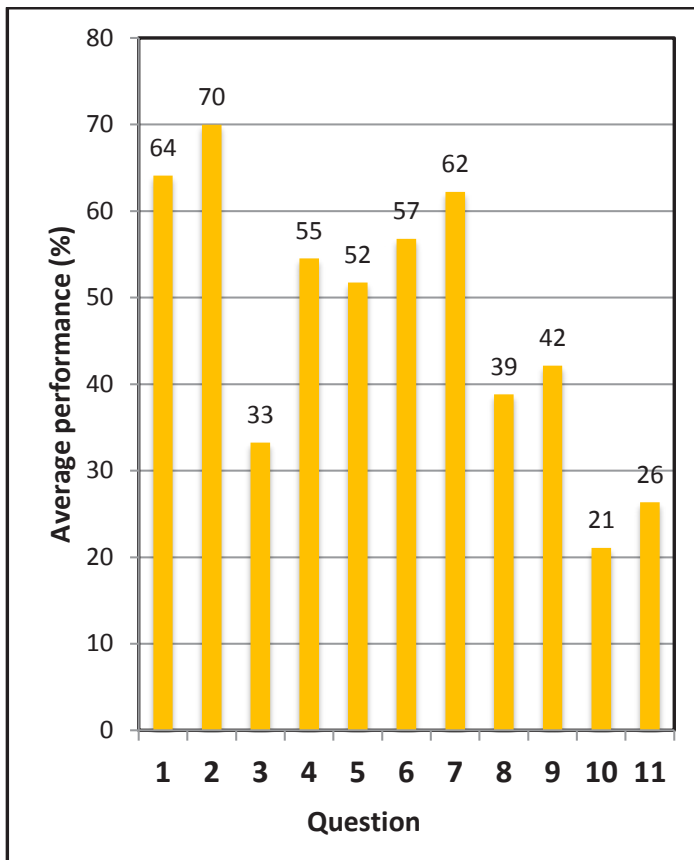
Q1	Equations, Inequalities and Algebraic Manipulation
Q2	Number Patterns & Sequences
Q3	Number Patterns & Sequences
Q4	Functions and Graphs
Q5	Functions and Graphs
Q6	Finance
Q7	Calculus
Q8	Calculus
Q9	Calculus
Q10	Probability
Q11	Probability and Counting

Graph 10.3.2 Average Percentage Performance per Subquestion for Paper 1

Bar graph of Average performance (%) versus Subquestions with values:
1.1: 73, 1.2: 87, 1.3: 6, 2.1: 77, 2.2: 57, 3.1: 33, 3.2: 33, 4.1: 62, 4.2: 69, 4.3: 75, 4.4: 56, 4.5: 64, 4.6: 43, 4.7: 19, 5.1: 83, 5.2: 65, 5.3: 65, 5.4: 37, 5.5: 31, 6.1: 69, 6.2: 50, 7.1: 80, 7.2: 79, 7.3: 51, 7.4: 40, 8.1: 53, 8.2: 29, 8.3: 43, 9.1: 56, 9.2: 19, 9.3: 59, 9.4: 37, 10.1: 34, 10.2: 12, 11.1: 26, 11.2: 64, FINAL TOTAL: 52
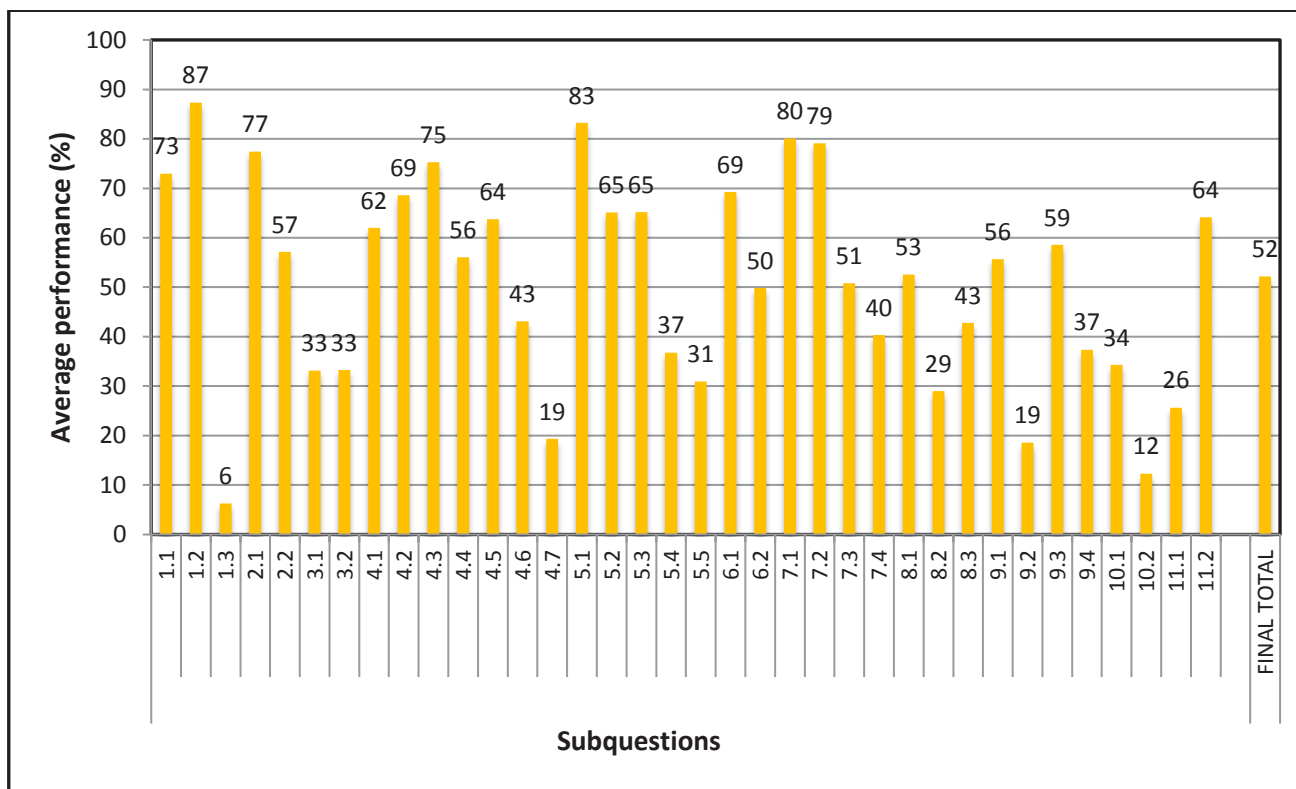
10.4 ANALYSIS OF LEARNER PERFORMANCE IN EACH QUESTION IN PAPER 1

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 $(x-6)(x+1)=0$ instead of $(x+6)(x-1)=0$. Others factorised it as $(x+5)(x-1)=0$. Some candidates omitted the '= 0'. They converted an equation to an expression and their answer would read:

$(x+6)(x-1) \therefore x = -6$ or $x = 1$.

(b)   Writing down the quadratic formula correctly and correct substitution therein remains problematic among some candidates. Some candidates wrote the quadratic formula incorrectly, e.g.

$$x = \frac{b \pm \sqrt{b^2 - 4ac}}{2a} \quad \text{or} \quad x = \frac{-b \pm \sqrt{b^2 + 4ac}}{2a} \quad \text{or}$$

$$x = -b \pm \frac{\sqrt{b^2 + 4ac}}{2a}$$

Such candidates lost marks for an incorrect formula. Incorrect rounding still poses a problem. Some candidates rejected the negative solution. These candidates confused the quadratic formula with surd equations.

(c)   In Q1.1.3 candidates were unable to determine the critical values of a quadratic inequality that had only 2 terms. Some candidates drew a parabola with the correct information but were unable to write down the solution. Many candidates treated the inequality in the same way as they would treat an equation. Their answer read:

$$4x^2 - 1 < 0$$
$$4x^2 < 1$$
$$x < \frac{1}{2} \quad or \quad x < -\frac{1}{2}$$

Candidates also showed little or no understanding of the set builder or interval notation.
The use of the words *and* and *or* were not understood.

(d)   Most candidates had some idea that they had to square both sides of the equation in Q1.1.4. However, many candidates were unable to multiply the binomials containing the surds. Very few candidates checked if the solutions obtained were valid in the original equation and consequently failed to reject $x = -4$ as a solution. Some candidates only squared one side of the equation. The candidates who squared the LHS only, did not reject the invalid solutions that they obtained.

(e)   In Q1.2 some candidates opted to make x the subject of the formula in $xy = 14 - 3x$, thereby making the question more complicated. Some candidates simplified $14 - 3(12 - y)$ to $11(12 - y)$.

When attempting to solve $y^2 - 9y - 22 = 0$, some candidates used the quadratic formula and then gave the answer as $x = 11$ or $x = -2$ instead of $y = 11$ or $y = -2$.

(f)   Candidates had very little idea on how to answer Q1.3. A number of candidates attempted to answer the question as follows:

$$30! = 3^k$$
$$k = \log_3 30!$$
$$k = 67.956855...$$

These candidates showed little understanding of the concept of a factor.

Suggestions for Improvement

(a)   More thorough teaching of factorisation in Grades 9 and 10 is needed. Learners should be taught to always multiply out again after they factorised, just to make sure that they get back the expression that they started off with.

(b)   Skills learnt in earlier grades should be revised from time to time. These skills are essential to solve many questions in Grade 12. Learners must be reminded to use the information sheet for the correct formula. Learners should write down, e.g. $a = 4$; $b = 3$ and $c = -5$, before substituting into the formula for the roots of a quadratic equation. Encourage learners to use brackets when substituting negative numbers, and when multiplying (e.g. $4(4)(-5)$).

(d)   Teachers should check whether learners know how to round off to a required number of places.

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(d)   Teachers should take some time, preferably in Grade 10, to focus on teaching learners how to represent inequalities (e.g. $-\frac{1}{2} < x < \frac{1}{2}$; $x < -\frac{1}{2}$ or $x > \frac{1}{2}$) on a number line and also how to write an inequality from the $-\frac{1}{2} < x < \frac{1}{2}$; $x < -\frac{1}{2}$ or $x > \frac{1}{2}$ hold learners in good stead as they are required to write inequa ... s in both examination papers.

(e)   Teachers should explain the difference between *and* and *or* in the context of inequalities. Learners cannot use these words interchangeably as they have different meanings.

(f)   When dealing with surd equations, learners should be reminded that they need to square both sides of the equation in order to maintain the balance. They should not square the radical parts of the equation only. Teachers must emphasise that implicit restrictions are placed on surd equations and that learners should continue to test whether their answers satisfy the original equation.

(g)   When attempting to solve simultaneous equations, teach learners to make one variable the subject of the formula in the simpler of the two equations. Where possible, avoid creating fractions as this creates complexity when solving the equation.

QUESTION 2: PATTERNS

Common Errors and Misconceptions

(a)   In Q2.2.1 a few candidates added the previous first difference of -27 to determine the next two terms in the quadratic number pattern. These candidates failed to realise that the first differences of a quadratic number pattern are not constant.

(b)   In answering Q2.2.2, some candidates calculated the second difference to be -2 instead of 2. Another common error was that some candidates used $2a + b = -31$ instead of $3a + b = -31$.

(c)   A few candidates assumed that n was 74 instead of T_n being 74. Some candidates made errors in determining an expression for T_n. They then obtained decimals or negative values for n but did not discard these values.

(d)   Many candidates did not realise that the word 'least' meant the minimum value of the terms in the sequence. Further, they could not make the association between the quadratic number pattern and the quadratic function.

(e)   In Q2.2.1 some candidates calculated the value of r as 2 instead of $\frac{1}{2}$. Some candidates calculated T_{21} instead of S_{21}. They did not realise that 'series' implied the sum of the first 21 terms.

(f)   Many candidates were able to write down the first line of the solution correctly, i.e. $\left(\dfrac{5}{8}\right)\left(\dfrac{1}{2}\right)^{n-1} > \dfrac{5}{8192}$.

However, poor application of the laws of exponents resulted in incorrect simplification: $\left(\dfrac{5}{16}\right)^{n-1} > \dfrac{5}{8192}$

Many candidates successfully simplified their solution to $\left(\dfrac{1}{2}\right)^{n-1} > \left(\dfrac{1}{2}\right)^{10}$. However, they did not

change the inequality sign around when solving for *n,* i.e. $n - 1 < 10$

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 read the questions carefully so that they know 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.

(c)   In calculating the difference between two terms, it must be reinforced that the correct process is to subtract the term on the left from the term on the right. This is applicable to both first and second differences. When working with quadratic number patterns, it is good practice to develop a scheme that clearly shows the first and second differences of the pattern.

QUESTION 3: PATTERNS

Common Errors and Misconceptions

(a)   It is evident that many candidates do not understand sigma notation. In Q3.1 they answered as

follows: $\displaystyle\sum_{y=3}^{10} \dfrac{1}{y-2} - \sum_{y=3}^{10} \dfrac{1}{y-1} = \dfrac{1}{3-2} - \dfrac{1}{3-1} = \dfrac{1}{2}$. Other candidates expanded to 3, 7 or 10 terms.

Some candidates ignored the instruction that the question had to be answered without using a calculator.

(b)   In Q3.2 some candidates were confused about which formula to use. They used the formula for the volume of a rectangular prism or the total surface area of a rectangular prism instead of the area of a rectangle. A number of candidates only calculated the area of the 3 steps shown in the diagram and not the 12 that was required. Some candidates calculated the area of one or two steps but could not see the pattern on account of the fractions.

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Suggestions for Improvement

(a)   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.

(b)   Teachers need to clarify that the sigma notation is a short-hand notation of a series of terms. Give learners enough examples where they have to expand the sigma notation. Use simple ones to start with, probably containing only a few terms. Also give them examples that do not represent arithmetic and geometric series.

(c)   Teach learners that when one needs to calculate the area of a complex shape, it is often a good idea to break this area up into smaller parts. One can then calculate the area of each of these smaller parts and add the answers to determine the area of the whole shape.

QUESTION 4: FUNCTIONS (PARABOLA AND HYPERBOLA)

Common Errors and Misconceptions

(a)   In Q4.1 many candidates gave the answer as $p = 1$ instead of $p = -1$. Some gave the answer as the equation of the asymptote: $x = -1$. This was not required.

(b)   In answering Q4.2 some candidates assumed that $a = 3$ and $b = 2$ in their calculations to show that $a = 3$ and $b = 2$. This is not acceptable. Some candidates did not realise that the coordinates of D were required to answer this question.

(c)   Some candidates were unable to recall the formula to calculate the x-coordinate of the turning point.

They used $x = \dfrac{-2b}{a}$ or $x = \dfrac{-b^2}{2a}$ instead of $x = \dfrac{-b}{2a}$. Other candidates calculated the derivative

correctly but did not equate the derivative to zero when calculating the x-coordinate of the turning point.

(d)   Many candidates confused the domain and range and gave the answer to Q4.4 in terms of x instead of y. Some candidates knew the values but wrote the answer as $\left(-\infty; -4\right]$ instead of $\left[-4; \infty\right)$.

(e)   In Q4.5 many candidates failed to link the angle of inclination (45°) with the gradient of the line. Instead candidates attempted to find the gradient by using the coordinates of C and the x-intercept of the parabola without realising that the tangent did not pass through the x-intercept.

(f)   Many candidates correctly indicated that the line could not be a tangent to the graph, but they could not provide a correct reason for their answer.

(g)   Very few candidates answered Q4.7 correctly. They failed to recognise that the transformation involved a reflection as well as a vertical and horizontal translation. In most cases, candidates gave the answers as $q = -4$ and m = 1 instead of $q = 4$ and m = -1.

Suggestions for Improvement

(a)   Teachers should pay attention to the concepts and definitions when teaching functions.

(b)   It is important that teachers use the equation for a hyperbola as given in the *CAPS* document,

i.e. $y = \dfrac{a}{x + p} + q$, and not $y = \dfrac{a}{x - p} + q$. If a teacher uses the second format, it could be confusing to learners as they will make mistakes with the sign of p .

(c)   Teachers need to illustrate how transformations influence the equation of a graph. There should be a good understanding of how the graph changes when the equation changes and vice versa.

QUESTION 5: FUNCTIONS (EXPONENTIAL AND INVERSE)

Common Errors and Misconceptions

(a)   Some candidates substituted correctly, i.e. $16 = k^4$, but could not proceed to calculate the value of *k*. Some candidates determined $\sqrt{16}$ instead of $\sqrt[4]{16}$ when they calculated the value of *k*.

(b)   In Q5.2 many candidates did not know that the graphs of a function and its inverse will always be symmetrical around the line $y = x$. Instead, many candidates wrote the equation of the graph that would be obtained reflecting the given graph about the *y*-axis or *x*-axis. Many candidates did not write the log equation in the correct way. They wrote $y = \log 2^x$ instead of $y = \log_2 x$. These two expressions have different meanings.

(c)   The graph that some candidates drew in Q5.3 did not correspond with the equation that was determined in Q5.2. Many candidates did not indicate the coordinates of two points on the graph as required. Some candidates were unable to establish the correct equation in Q5.2 but drew the correct graph by reflecting the given graph about the line $y = x$.

(d)   Candidates did not understand what was required in Q5.4. Many provided answers that were not related to the graphs. Some candidates had some idea about the answer to Q5.4.2 but did not realise that the graph did not pass the *y*-axis. They wrote their answer as $x \le \dfrac{1}{2}$ instead of $0 < x \le \dfrac{1}{2}$.

(e) Many candidates had difficulty in establishing that $f(-x)$ was actually $(2)^{-x}$. This hindered any further progress in this question. Some candidates applied exponential laws incorrectly, e.g. $2^x - \left(\frac{1}{2}\right)^x = \left(\frac{3}{2}\right)^x$ and $2^x - \left(\frac{1}{2}\right)^x = 2^x\left(1 - \frac{1}{2}\right)$.

Suggestions for Improvement

(a) Teachers should spend some time teaching exponential equations and they need to clearly distinguish between the different types of exponential equations.

(b) When dealing with the inverse function, one of the basics to be explored and taught is symmetry about the line $y = x$. Reinforce among learners that by 'swopping the x and y coordinates' they are obtaining points that lie on the inverse of the given graph. This is particularly useful in establishing the intercepts of the inverse.

(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) Teachers should demonstrate in a systematic way, how to read off solutions from graphs. Learners must also be able to devise their own strategies do this.

QUESTION 6: FINANCE

Common Errors and Misconceptions

(a) Many candidates used the future value annuity formula in Q6.1. These candidates did not realise that the investment made by each person was a single payment and not recurring payments. Some candidates did not take into account the bonus that was applicable to Kuda's investment. Some candidates made mistakes when converting the rates of interest to decimal values. Some used the incorrect interest rate for the incorrect person. It was also observed that candidates made the correct substitution into the correct formula but arrived at incorrect answers. This suggests that some candidates were unable to use their calculators correctly.

(b) In Q6.2.1 some candidates calculated the value of the monthly repayment instead of the number of payments required to settle the loan. Other candidates used R5 066,36 instead of R6 000. They did not read the question correctly. Some candidates showed poor simplification skills. They wrote $-\left(\frac{121}{120}\right)^{-n}$ as $\left(-\frac{121}{120}\right)^{-n}$. When determining the number of payments required to settle the loan, some candidates rounded down to 157 instead of rounding up to 158.

(c)   Many candidates did not comprehend the question and did not realise that the question revolved around the difference between R6 000 and R5 066,36. Some candidates only calculated R933,64(108). They did not take into account the interest that R933,64 earned over the 9 years. Many candidates incorrectly used the present value annuity formula as the context of the question was a loan.

Suggestions for Improvement

(a)   Learners should be discouraged from only looking for key words in a finance question, they must read the entire question instead. In this way they will be able to understand what the question requires. Having a complete picture of the question will assist in selecting the appropriate formula. Although the context of Q6.2 was a loan, the problem in Q6.2.2 was actually one of savings and therefore the future value annuity formula was applicable to this question.

(b)   Learners need deeper insight into the relevance of each of the formulae and under which circumstances each can be used. The variables in each formula must be explained. More practice in Financial Mathematics is necessary so that learners can distinguish amongst the different formulae.

(c)   Teachers should demonstrate all the steps when using a calculator.

QUESTION 7: CALCULUS

Common Errors and Misconceptions

(a)   In Q7.1 candidates made simplification or notational errors. Many candidates made the following

notational errors: $f(x) = \lim_{h \to 0} \dfrac{f(x+h) - f(x)}{h}$ or $\lim_{h \to 0} = \dfrac{f(x+h) - f(x)}{h}$ or $\dfrac{\lim f(x+h) - f(x)}{h \to 0 \qquad h}$.

Some candidates made mistakes when removing brackets: $\lim_{h \to 0} \dfrac{4 - 7(x+h) - 4 - 7x}{h}$.

Some candidates 'converted' the linear expression $(4 - 7x)$ to a quadratic expression $(4 - 7x^2)$.

(b)   The common error in Q7.2 was to rewrite $\sqrt{x^3}$ as $x^{\frac{1}{3}}$ or $x^{\frac{2}{3}}$ instead of $x^{\frac{3}{2}}$.

Another common response that included incorrect notation and unnecessary differentiation was:

$$y = 4x^8 + \sqrt{x^3}$$
$$\frac{dy}{dx} = 32x^7 + x^{\frac{3}{2}}$$
$$= 224x^6 + \frac{3}{2}x^{\frac{1}{2}}$$

(c)   Many candidates could not differentiate terms with literal coefficients as presented in Q7.3.1.

A common response was $y = ax^2 + a$. Candidates differentiated with respect to x and a in the $\dfrac{dy}{dx} = 2x + 1$

same question.

(d)   In Q7.3.2 many candidates could not differentiate with respect to a, i.e. they could not interpret $\dfrac{dy}{da}$.
A common error was to divide throughout by a: $y = ax^2 + a$

$$\frac{y}{a} = x^2 + 1$$

(e)   Most candidates were able to calculate the value of b in Q7.4. However, they were unable to proceed correctly from this point. Many did not calculate the gradient of the perpendicular line. Another common error was that many candidates assumed that the gradient of the tangent was 1 and therefore the gradient of the perpendicular line was –1. Some candidates could not calculate the derivative of

$y = x + \dfrac{12}{x}$ correctly. Their answer was $\dfrac{d}{dx} = -12x^{-2}$.

Suggestions for Improvement

(a)   Emphasis should be placed on the use of the correct notation when determining the derivative, either when using first principles or the rules.

(b)   Teachers should explain the need for brackets when determining the derivative from first principles. This prevents the incorrect simplification that follows.

(c)   Teachers should explain the meaning of the notation $\dfrac{dy}{dx}$, namely that 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 that has x as a variable. The derivative can then be determined. The derivative of variables other than x should also be discussed.

(d)   Learners should be reminded that the value of a derivative for a certain value of x is the gradient of the tangent to the curve at that point.

QUESTION 8: CALCULUS

Common Errors and Misconceptions

(a)   In Q8.1 many candidates gave the answer as $t = 6$. They calculated the value of t when $h = 0$ instead of calculating the value of h when $t = 0$.

(b)   Many candidates confused 'how many times' with 'at what time' in answering Q8.2. They gave the answer as $t = 6$ instead of indicating that the insect reached the floor only once.

(c)   In answering Q8.3 some candidates could not correctly multiply out $h(t)$. Some candidates calculated $h'(t)$, but did not equate $h'(t)$ to 0. Some calculated the values of t but did not calculate the maximum height. Other candidates calculated $h''(t)$, equated it to 0, and solved for t not realising that in this way they will calculate the t-value of the point of inflection and not the maximum.

Suggestions for Improvement

(a)   When teaching graphs of cubic functions, teachers should also include those that have one stationary point.

(b)   Teachers need to expose learners to word problems in order for them to gain confidence.

(c)   The calculation of critical values should not only be restricted to graphical questions. Expose learners to calculating critical values in contextual questions as well. This will help learners to appreciate the calculations that they perform in Mathematics.

QUESTION 9: CALCULUS

Common Errors and Misconceptions

(a)   In Q9.1 some candidates used first principles to calculate the derivative. This was not required.

(b)   Many candidates calculated the derivative of $3x^3$ as $6x^2$ instead of $9x^2$. Many candidates did not factorise $3x^3 - 9x^2$. They merely divided both sides of the equation $3x^3 - 9x^2 = 0$ by x^2, and so lost one of the solutions.

(c)   Very few candidates attempted Q9.2. Most candidates were unable to interpret what the question required.

(d)   Some candidates calculated the distance to be –9. They did not realise that distance cannot be negative.

Many candidates opted to use the algebraic method to answer this question. However, they incorrectly treated the inequality like an equation. Their answer was:

$3x^2(x-3) < 0$

$3x^2 < 0$ or $x - 3 < 0$

$x < 0$ or $x < 3$

Suggestions for Improvement

(a) Teachers need to ensure that learners have a clear understanding of turning point and point of inflection. Learners need to be aware of how the first and/or second derivatives change at the turning point and point of inflection.

(b) Teachers should draw the graphs of $f(x)$, $f'(x)$ and $f''(x)$ on the same system of axes. This will allow learners to see the relationships among the critical values of each graph as well as the shape of each graph.

(c) Teachers should ensure that there is enough time for learners to understand the application of Calculus fully.

QUESTION 10: PROBABILITY

Common Errors and Misconceptions

(a) In Q10.1 some candidates did not read the question and used 7 days of a week in their calculations. Many candidates did not know how to answer this question. The most common response to this question was $\dfrac{1}{4} \times \dfrac{1}{4} = \dfrac{1}{16}$.

(b) Many candidates did not answer Q10.2. Some candidates attempted to draw a tree diagram but could not draw it correctly.

Suggestions for Improvement

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.

QUESTION 11: PROBABILITY AND COUNTING PRINCIPLES

Common Errors and Misconceptions

(a) In Q11.1.1 some candidates confused mutually exclusive events with independent events. They drew a Venn diagram having no intersection of A and B. Some candidates were able to calculate that P(A and B) = 0,1. However, they were unable to calculate the other probabilities correctly. On the Venn diagram they indicated P(A only) as 0,4 instead of 0,3.

(b) In Q11.1.2 many candidates calculated P(A or B) instead of P(A or not B). A few took into account that there was an intersection of the two events: A and not B.

(c)   Many candidates used factorial notation when writing down the various options, e.g. $5! \times 1 \times 6!$ instead of $5 \times 1 \times 6$.

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)   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.

(d)   Teachers should refrain from teaching rules to different situations, rather aim at reasoning out the calculations that are required to answer the question.

(e)   Teachers should only introduce factorial notation once learners have a good understanding of the fundamental counting principle.

10.5 OVERVIEW OF LEARNER PERFORMANCE IN PAPER 2

(a)   Individual performance in the paper varied from very poor to excellent.

(b)   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.

(c)   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.

(d)   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.

(e)   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.

(f)   Candidates need to read the questions with due diligence. By glossing over questions, candidates are overlooking the critical information contained in 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.

Graph 10.6.1   Average Percentage Performance per Question for Paper 2
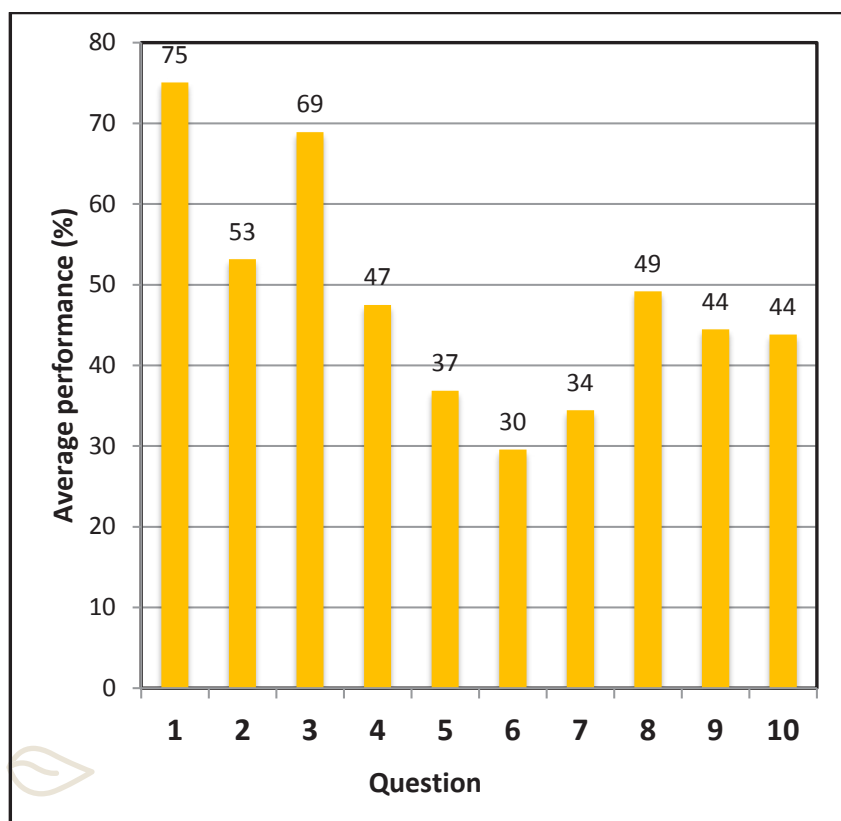
Q1	Data Handling
Q2	Data Handling
Q3	Analytical Geometry
Q4	Analytical Geometry
Q5	Trigonometry
Q6	Trigonometry
Q7	Trigonometry
Q8	Euclidean Geometry
Q9	Euclidean Geometry
Q10	Euclidean Geometry

Graph 10.6.2 Average Percentage Performance per Subquestion for Paper 2
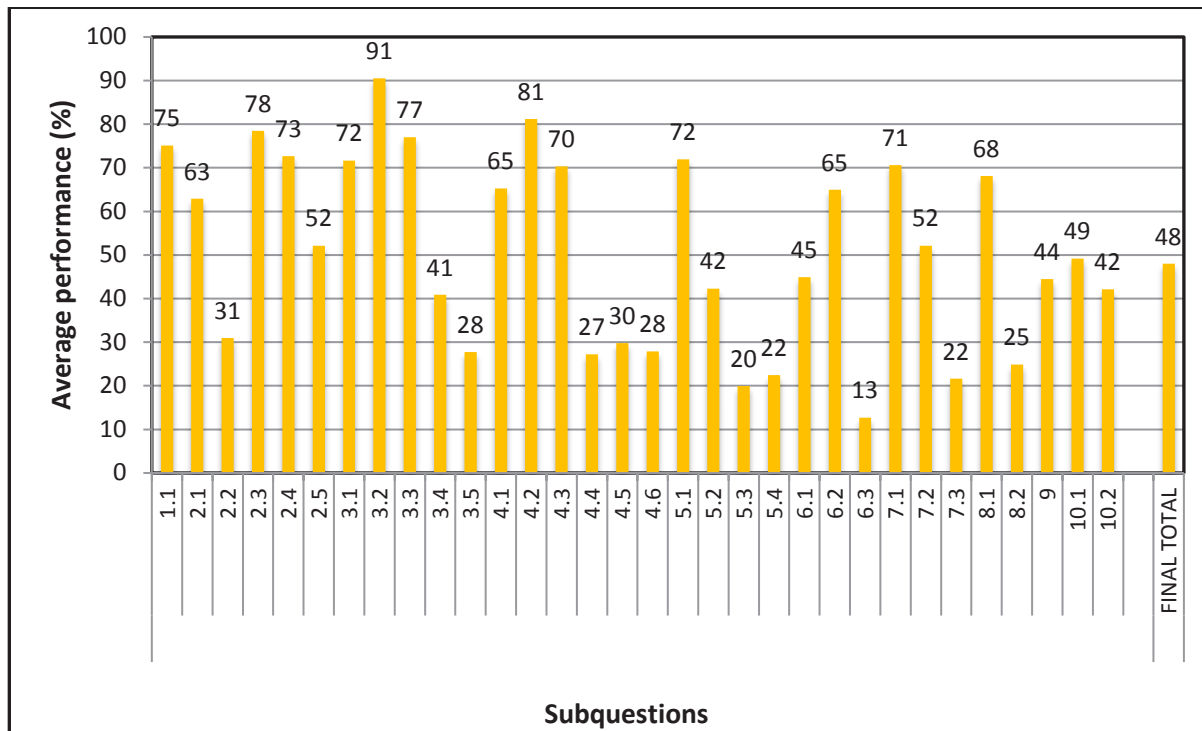
10.7 ANALYSIS OF LEARNER PERFORMANCE IN EACH QUESTION IN PAPER 2

QUESTION 1: DATA HANDLING

Common Errors and Misconceptions

(a)   In Q1.1 some candidates could not calculate the values of *a* and *b* correctly. This was on account of entering incorrect values into the calculator. Some could not round off correctly to two decimal places. A few candidates swopped the values of *a* and *b* in the equation. Their equation was $\hat{y} = 0,41 - 1946,88x$. A few candidates did not identify the independent and dependent variables correctly from the table.

(b)   Some candidates substituted incorrectly in Q1.2. They substituted 14 000 for *y* instead of *x*. Some candidates were confused by the word 'predict' and resorted to merely guessing random answers. Others calculated the predicted value to be the sum of R3 000 and R3 500 divided by 2. This was incorrect.

(c)   Some candidates did not realise that this question required the value of *r*. Instead they commented on the strength of the relationship between the monthly income and the monthly repayment of a car.

(d)   Candidates could not relate the question in Q1.4 to the information that was given. Many just guessed an answer.

Suggestions for Improvement

(a)   Learners should be given multiple opportunities to practice calculator skills. Learners should 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.

(b)   Teachers should emphasise correct rounding.

(c)   Teachers should explain each definition or concept in detail. It is important that the definition of independent and dependent variables is discussed.

(d)   Learners should be taught how to use the regression line to make predictions.

QUESTION 2: DATA HANDLING

Common Errors and Misconceptions

(a)   In Q2.1 many candidates gave the frequency corresponding to the class interval, i.e. 12, as the answer instead of calculating the cumulative frequency.

(b)   Many candidates used the given values of *a* and *b* in their calculations. Some candidates did not take the frequencies into account in their calculations. Some candidates used the lower or upper class limits in their calculations. They should have used the midpoints of the classes in their calculations. Other candidates divided by 6 because there were 6 class intervals in the table. They should have divided by 100, the total number of observations in the data set.

(c)   A few candidates were unable to identify the modal class from the frequency table.

(d)   A number of candidates were unable to draw an ogive correctly. They plotted the cumulative frequency against the lower limit or midpoint of the class interval and did not ground the ogive. Some were unaware that the ogive is a smooth curve and used a ruler to join the points. Some candidates drew a frequency polygon instead of the required ogive.

(e)   In answering Q2.5, candidates were able to read off the ogive correctly but failed to subtract this number from 100.

Suggestions for Improvement

(a)   Teachers should stress that it is not permissible for learners to use the information that that they must prove as if it is given information.

(b)   Graphs is an integral part of Data Handling. Learners should be able to draw graphs, read off from graphs and interpret graphs.

QUESTION 3: ANALYTICAL GEOMETRY

Common Errors and Misconceptions

(a)   Some candidates did not write the equation of PR but gave the coordinates of P.

(b)   Some candidates were 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 or they swapped the x

and y values in the formula.

(c)   In answering Q3.2.3 some candidates used the correct gradient of RS but substituted a point that did not lie on RS, e.g. they used C(0 ; 5) in determining the equation. Some candidates assumed the D was the midpoint of RS and others assumed that CO was equal to FD.

(d)   Some candidates did not make correct substitutions into the distance formula when answering Q3.3.
$$2\sqrt{5} = \sqrt{(-3 + 5)^2 + (-7 + k)^2}$$
$$20 = 4 + 49 - 14k + k^2$$
$$k^2 - 14k + 33 = 0$$
$$(k - 11)(k - 3) = 0$$
$$k = 11 \quad or \quad k = 3$$

(e)   Many candidates used the coordinates of D as the midpoint of the diagonals in parallelogram TDNS.

(f)   Many candidates could not visualise triangle RDR$'$. Consequently, they were unable to answer this question. Some candidates were not familiar with the notation R$'$. In some instances, candidates named all the angles that they calculated as θ. This caused confusion and candidates used incorrect angles in their calculations.

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)   Learners should read the question for clues about which formula is to be used when answering the question.

(c)   Teachers should request learners to label the coordinates as $(x_1 ; y_1)$ and $(x_2 ; y_2)$ on the diagram. This should prevent learners from making mistakes when substituting the coordinates into a formula.

(d)   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 when answering follow-up questions. Learners should label different angles using different symbols, e.g. α, β, θ, etc.

(e)   To answer questions in analytical geometry well, learners should master the properties of quadrilaterals and triangles.

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(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)   Candidates could not interpret the diagram correctly and hence could not determine the coordinates of M. Some used A(–1 ; 0) as the centre of the circle.

(b)   In Q4.2 some candidates were unaware that N was the midpoint of CB.

(c)   In answering Q4.3 some candidates used the gradient of the radius to be equal to the gradient of the tangent. Some candidates used the coordinates of A or B to determine the equation of the tangent even though A and B were not on the tangent.

(d)   Candidates were able to calculate the critical values but were unable to use this information correctly when writing down the answer. They wrote: $t \geq 3$ or $t \leq 1$, $3 < t < 1$ or $t > 3$ or $t < 1$ as their answers. All of these were incorrect.

(e)   Many candidates were able to calculate the coordinates of D but were unable to make any further progress in Q4.5.

(f)   In many instances, candidates did not indicate the figures that they were working with. For example:

$$\text{Area of quad BCDO} \quad = \frac{1}{2}b \times h + \frac{1}{2}b \times h + l \times b$$

$$= \frac{1}{2}(2)(1) + \frac{1}{2}(\sqrt{2}) \times (1) + \sqrt{2} \times 2$$

Suggestions for Improvement

(a)   Teachers should encourage learners to analyse the diagram before attempting any questions. They must first write down any given information on the diagram and then make deductions from the given information.

(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 should revise the work done in earlier grades.

(d)   Learners should be reminded to refer to the information sheet for the relevant formula.

(e)   Although learners determine the equation of a straight line from Grade 9, they should be reminded that the minimum requirements to determine the equation of a straight line is the gradient of the line and the coordinates of one point through which the line passes.

(f)   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 candidates lacked knowledge of the reduction formulae. In particular, they reduced as follows:

$$\cos(90^0 - x) = \cos x \text{ or } \cos(90^0 - x) = -\sin x.$$

(b)   Candidates missed critical steps of working in Q5.2.

$$\frac{\sin^2 35^0 - \cos^2 35}{4\sin 10^0 \cos 10^0}$$
$$= \frac{-\cos 2(35^0)}{2\sin 2(10^0)}$$
$$= \frac{-\cos 70^0}{2\sin 20}$$
$$= -\frac{1}{2}$$

(c)   Some candidates could not manipulate the double-angle expansion correctly when answering Q5.3. They incorrectly wrote $2\cos^2 A$ as $\cos 2A - 1$ instead of $\cos 2A + 1$.

(d)   Many candidates could not identify the compound angle expansion in

$\sin(x + 25°)\cos 15° - \cos(x + 25°)\sin 15°$. Instead of writing this as $\sin((x + 25°) - 15°)$, many candidates expanded $\sin(x + 25°)$ and $\cos(x + 25°)$. This made the question more complicated.

(e)   Many candidates could not understand what was required in Q5.4.2 and hence they did not attempt it.

Suggestions for Improvement

(a)   Learners need to understand 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.

(b)   Learners must be advised to show all steps when working with reduction formulae. Marks are not awarded to candidates who make errors with the signs.

(c) Learners should master fundamental algebraic manipulation. These skills are integral in simplifying trigonometric expressions.

(d) 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 should also be required to write down the compound angles when given the expansion.

(e) Teachers should ensure that learners revise Grade 11 Trigonometry regularly in the Grade 12 year.

QUESTION 6: TRIGONOMETRY

Common Errors and Misconceptions

(a) In Q6.1 many candidates were confused between domain and range. Some candidates gave an answer in terms of x. Some candidates did not identify graph f correctly and gave the range of the incorrect graph. Some candidates wrote down the interval incorrectly as $0 \geq y \geq -2$.

(b) In Q6.2 some candidates were unable to read off the critical values correctly and consequently were unable to answer when graph f was decreasing.

(c) In answering Q6.3, many candidates inadvertently calculated the points of intersection of the two graphs by letting PQ = 0. They did not realise that they were stating that the distance between the two graphs was zero. This was very different to what the question required. Some candidates were able to arrive at the expression $PQ = -2\sin^2 x - \sin x + 2$ but could not proceed any further.

Suggestions for Improvement

Teachers should not confine the teaching of graphs to sketching. Learners should also be exposed to exercises in which they have to interpret graphs and read off solutions from the graphs.

QUESTION 7: TRIGONOMETRY

Common Errors and Misconceptions

(a) In Q7.1 some candidates did not understand what 'in terms of x' meant. Some candidates used the incorrect trigonometric ratio. Some did not substitute sin 60° with $\dfrac{\sqrt{3}}{2}$.

(b) Some candidates could not recall the properties of a rhombus. Many candidates gave the answer to $K\hat{C}F$ as 90° and a few others gave the answer as 60°.

(c)   Some candidates did not understand that the two rhombuses were on two different planes, one was horizontal and the other was inclined. Candidates were not sure which rule to use to calculate the length of KF. Some candidates deduced that $y = 90°$, $K\hat{C}F = 90°$ and then used the formula for the area of a triangle to calculate the area of $\triangle$AKF.

Suggestions for Improvement

(a)   Teachers should inform learners that 'Determine AK in terms of x' means that AK must be the subject of an expression and that the expression must be in terms of x.

(b)   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.

(c)   Learners should be encouraged to highlight the different triangles using different colours.

(d)   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.

(b)   In Q8.1.1 some candidates struggled to differentiate between a parallelogram and a cyclic quadrilateral. Some candidates used the exterior angle of a cyclic quadrilateral incorrectly, i.e. they made this statement $\hat{R} = \hat{S}_2 = 136^0$ [ext angle of cyclic quad].

(c)   Some candidates incorrectly assumed that QWKR was a cyclic quadrilateral in attempting to answer Q8.1.2. Some candidates incorrectly indicated that $\hat{P} = 90°$ [∠subt by dia].

(d)   Candidates could not identify $P\hat{Q}W$ correctly. They were used to the angles being named as $\hat{Q}_2$.

(e)   Candidates could not differentiate between alternate and corresponding angles.

(f)   In Q8.2.1 some candidates incorrectly assumed that the angles at T were 90°. They then used trigonometric ratios to calculate the sizes of $E\hat{F}D$ and $E\hat{C}D$.   Some candidates incorrectly deduced that since EF = 9 and DC = 18 then EF || DC [midpoint theorem].

(g)   In answering Q8.2.2 some candidates used the reason 'angles in the same segment' instead of the converse of this theorem.

Suggestions for Improvement

(a)   Learners should be encouraged to scrutinise the given information and the diagram for clues about which theorems could be used in answering the question.

(b)   Teachers must cover the basic work thoroughly. An explanation of the theorem should be accompanied by showing the relationship in a diagram.

(c)   Learners are encouraged to use the list of reasons provided in the *Examination Guidelines*.

(d)   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.

(e)   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.

(f)   Learners should be given exercises where the converses of the theorems are used in solving questions.

QUESTION 9: EUCLIDEAN GEOMETRY

Common Errors and Misconceptions

(a)   Candidates could not link the correct angle at the centre with the correct angle at the circumference.

(b)   Some candidates incorrectly assumed that TMPO was a cyclic quadrilateral.

(c)   Some candidates could not link $\hat{T}_1$ with $\hat{P}_1$.

Suggestions for Improvement

(a)   Learners should be taught that all 4 vertices of a quadrilateral must lie on the same circle for the quadrilateral to be cyclic.

(b)   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.

(c)   Learners should be forced 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.

(d)   Learners need to be told 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)   Many candidates did not show or state the construction, nor did they indicate the construction correctly on the diagram. Most failed to indicate that the heights were perpendicular to the sides of the triangle. Some candidates used the incorrect triangles in their proof. This did not lead them to the desired conclusion. Some could not provide the correct reasons in Q10.1.

(b)   In Q10.1.2 candidates assumed that WSTV was a cyclic quadrilateral. Some candidates wrote incorrect statements: $\hat{W}_2 = \hat{V}_1 = x$ [alt angles, WT || RV] and $\hat{W}_2 = \hat{S}_2 = x$ [both = x].

(c)   It became confusing for candidates who assumed that WSTV was a cyclic quadrilateral in Q10.1.2 to now prove that WSTV was a cyclic quadrilateral in Q10.2.2(a). Again, many gave the reason as 'angles in the same segment' when the converse was applicable.

(d)   In Q10.2.2(b) many candidates incorrectly started their answer with WR = WV and therefore struggled to conclude that ∆WRV was isosceles.

(e)   Many candidates could select the correct pairs of equal angles that will result in ∆WRV being similar to ∆TSV. Instead they stated a number of angles that were each equal to x and then concluded that ∆WRV ||| ∆TSV.

(f)   In answering Q10.2.2(d) many candidates could only state that ∆WRV ||| ∆TSV $\therefore \dfrac{WR}{TS} = \dfrac{RV}{SV} = \dfrac{WV}{TV}$ They could not proceed any further.

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 include the theorems and the converses.

Chapter 11

PHYSICAL SCIENCES

The following report should be read in conjunction with the Physical Sciences question papers of the November 2019 Examinations.

11.1 PERFORMANCE TRENDS (2015–2019)

The number of candidates who wrote the Physical Sciences examination in 2019 decreased by 7 841 in comparison to that of 2018. The performance of the candidates in 2018 reflects a slight improvement at the 30% level from 74,2% in 2018 to 75,5% and at the 40% level from 48,7% in 2018 to 51,7%.
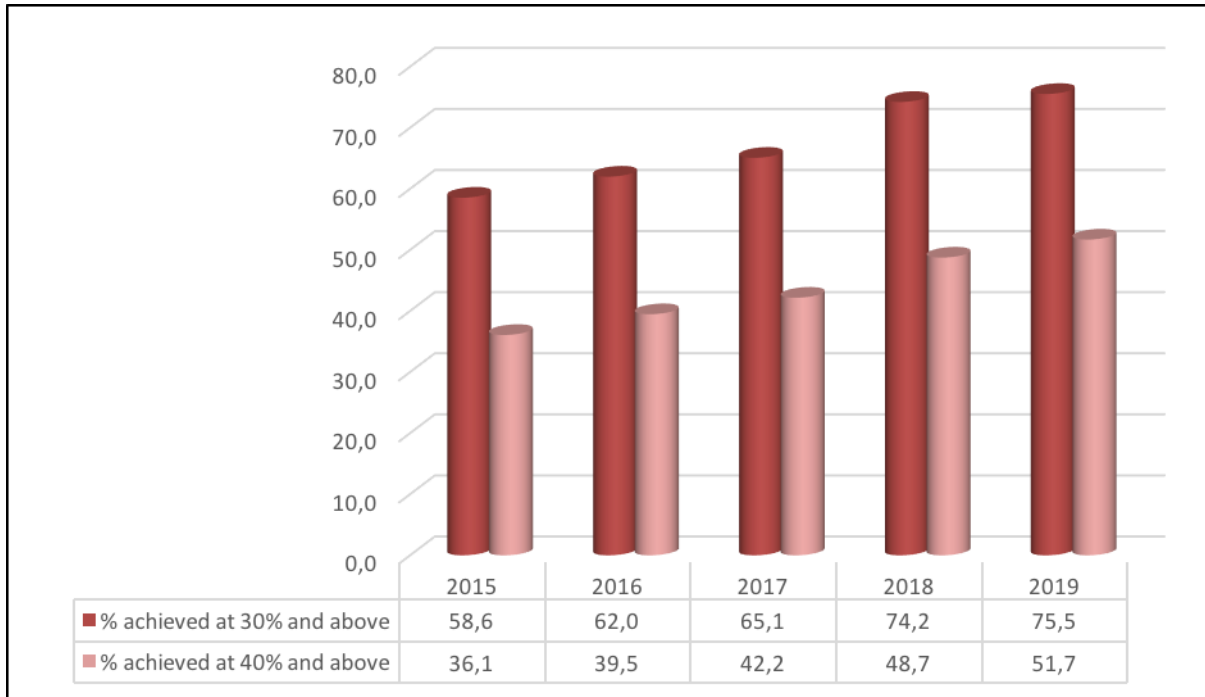
Table 11.1.1   Overall Achievement Rates in Physical Sciences

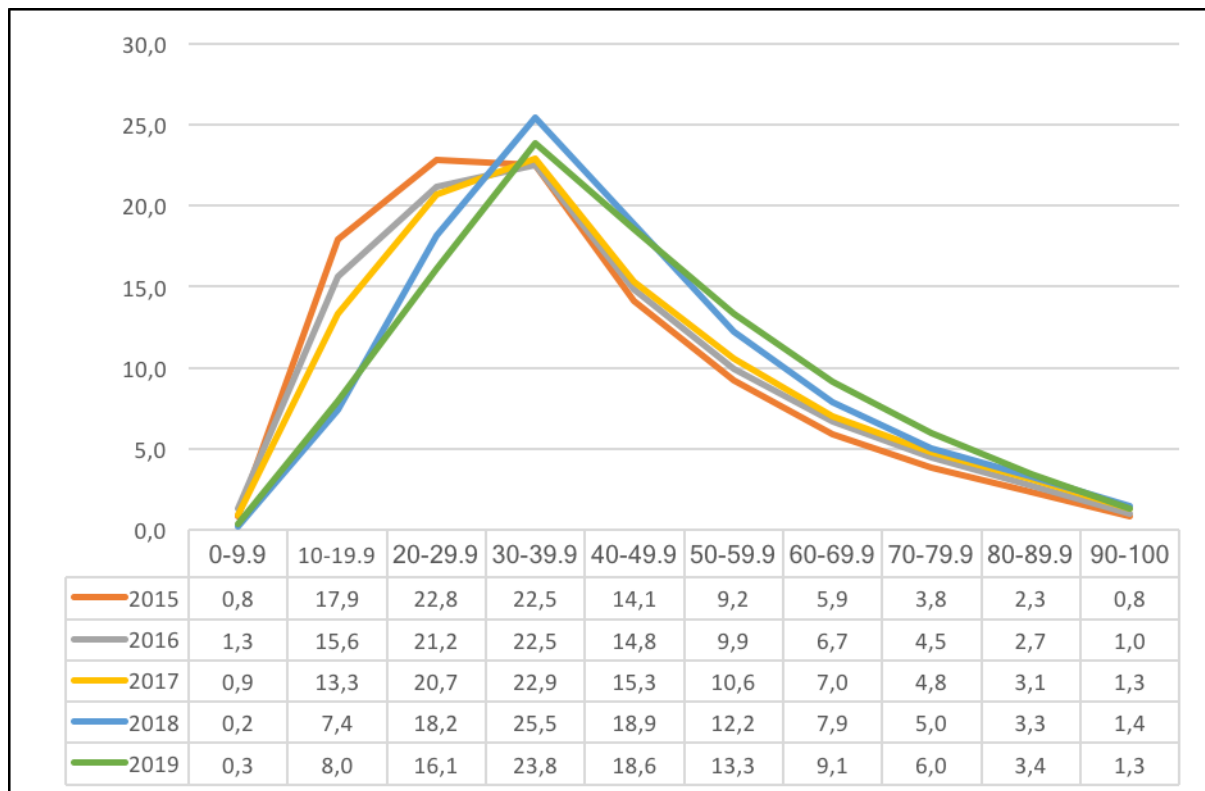| Year	No. wrote	No. achieved at 30% and above	% achieved at 30% and above	No. achieved at 40% and above	% achieved at 40% and above
2015	193 189	113 121	58,6	69 699	36,1
2016	192 710	119 467	62,0	76068	39,5
2017	179 561	116 862	65,1	75 736	42,2
2018	172 319	127 919	74,2	84 002	48,7
2019	164 478	124 237	75,5	85 034	51,7

The slight improvement in performance of candidates in 2019 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)

	2015	2016	2017	2018	2019
■ % achieved at 30% and above	58,6	62,0	65,1	74,2	75,5
■ % achieved at 40% and above	36,1	39,5	42,2	48,7	51,7

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
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
2019	0,3	8,0	16,1	23,8	18,6	13,3	9,1	6,0	3,4	1,3

## 11.2 OVERVIEW OF LEARNER PERFORMANCE IN PAPER 1

General Comments

(a)   The questions on Newton's Laws of Motion, Momentum, Work, Energy and Power Electrostatics and Electric Circuits (Q2, Q4, Q5, Q7 and Q8) were generally answered well.

(b)   Grade 10 work and Grade 11 work were poorly understood. This work should be integrated with the work done in Grade 12, especially in classwork, homework and tests.

(c)   Questions pertaining to pure recall of content were very poorly answered because keywords and phrases were omitted from definitions. Short informal assessment tasks relating to these issues will greatly assist in improving these shortcomings. This can be used to good effect in content relating to definitions and laws listed in the *CAPS* and the Examination Guidelines.

(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. 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 correctly with scientific formulae. 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 in having a deeper understanding of Physics concepts.

(j)   It is critical that learners understand the concept of a variable that is kept constant in a particular equation and to use this information to find relationships between variables in that equation.

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 as a Percentage in Paper 1
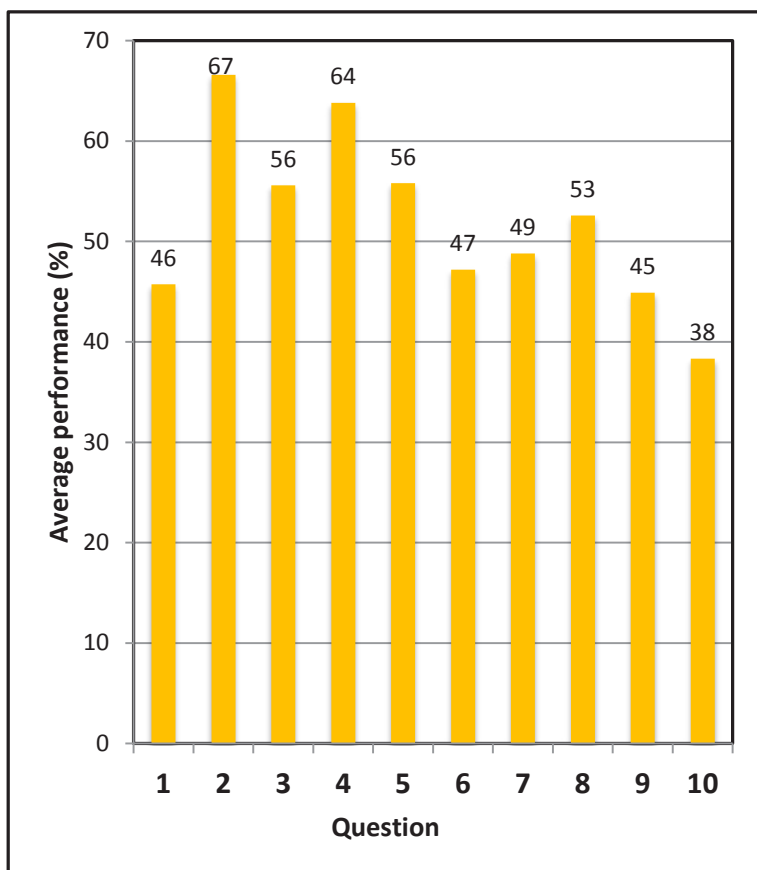
Q1	Multiple-choice questions - all topics
Q2	Newton's laws of motion
Q3	Vertical projectile motion
Q4	Momentum
Q5	Work, energy and power
Q6	Doppler effect
Q7	Electrostatics (Coulomb's Law and Electric Fields)
Q8	Electric circuits
Q9	Electrodynamics: motors, generators and alternating current
Q10	Photoelectric effect

Graph 11.3.2 Average Marks per Subquestion as a Percentage for Paper 1
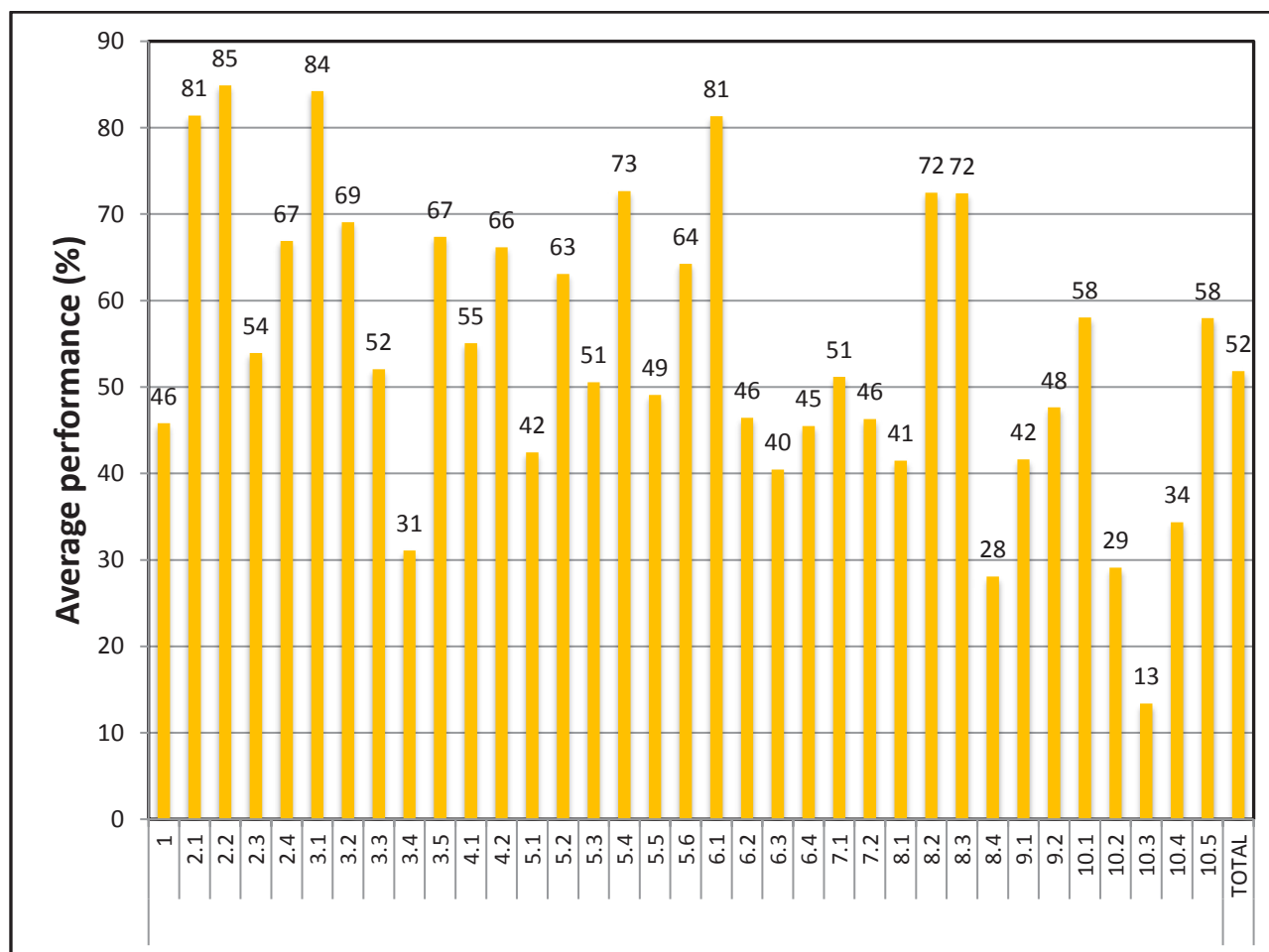
11.4 ANALYSIS OF LEARNER PERFORMANCE IN EACH QUESTION IN PAPER 1

QUESTION 1: MULTIPLE-CHOICE QUESTIONS

Common Errors and Misconceptions

(a)   In Q1.2 many candidates did not realise that the radius of the planet was R and that the new height above the centre of the planet is 3R instead of 2R, as stated in the question.

(b)   In Q1.5 candidates failed to integrate their mathematical skills with the scientific concepts, namely change in position (displacement), equations of motion, velocity and momentum.

(c)   Most candidates failed to apply the law of conservation of charge in Q1.7, a topic dealt with in detail in Grade 10.

(d)   Many candidates failed to associate the quantisation of light energy to the photoelectric effect.

Suggestions for Improvement

(a)   Multiple-choice questions test learners' understanding of concepts, principles and laws and the relationship between the dependent, independent and constant variables 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 concepts, laws and principles, followed by generalisations and making predictions.

(b)   Learners must also be encouraged to refer to the formula sheet because it gives the formulae of laws and principles, as well as the relationship between the variables.

(c)   Teachers must include the use of ICT when teaching the subject. Multimedia/Software, such as *PHET* and *Edukite*, as well as YouTube videos to be used to demonstrate the answers of multiple-choice questions through simulations (virtual experiments).

(d)   It is recommended that a booklet containing multiple-choice questions on different topics from different sources, such as previous NSC and provincial question papers and textbooks should be prepared. These booklets should also show and explain how the correct answer is obtained.

QUESTION 2: NEWTON'S LAWS OF MOTION

Common Errors and Misconceptions

(a)   In Q2.1 candidates omitted keywords in their definition, especially the word 'resultant/net'. Instead of 'net force' many of the candidates simply wrote 'force'.

(b)   A considerable number of candidates used the incorrect 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 and also omitted arrows in the free-body diagrams.

(d)   Candidates swopped $\sin\theta$ with $\cos\theta$ when determining the components of the weight.

(e)   Candidates did not realise that the net force increased after the block started moving on a frictionless surface as a result of less forces opposing the motion of the block.

Suggestions for Improvement

(a)   Teachers should adhere to and emphasise the definitions in *CAPS* and the Examination Guidelines. Keywords must be emphasised in these definitions.

(b)   The importance of drawing free-body diagrams for each object correctly and their usefulness in problem-solving must be emphasised. Teachers must insist that Newton's Second Law be applied to each object, which will provide an equation for the motion of each object in a specific direction. A method of solving simultaneous equations can be used to solve for the unknown in the equation.

(c)   Teachers should emphasise that the net force acting on an object is the sum of all the forces acting on the object parallel to the direction of motion of the object.

(d)   Learners must be systematically exposed to different questions in which trigonometric relations must be applied.

QUESTION 3: VERTICAL PROJECTILE MOTION

Common Errors and Misconceptions

(a)   Many candidates omitted the keyword 'only' with regard to the gravitational force in their definition of free fall.

(b)   The candidates experienced problems with the signs of velocity and acceleration in their substitutions into the appropriate equations of motion.

(c)   Some of the candidates used $a = 0$ m·s^{-2} at the maximum height.

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. Teachers must emphasise that the direction of gravitational acceleration does not change in a question; it remains constant.

(b)   Learners must be taught the equations of motion in Physics and how these equations are related to the equations in Mathematics. Learners must be assisted in relating the relevant points of a position versus time graph to the corresponding points on a velocity versus time graph.

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

QUESTION 4: MOMENTUM

Common Errors and Misconceptions

(a)   In Q4.1 many candidates omitted the word 'external' in their definition of an isolated system as used in Physics. Once again keywords in the definitions should be emphasised.

(b)   Many candidates erroneously used the formula $\Sigma p_i = \Delta \Sigma p_f$ instead of $p = mv$.

(c)   Some candidates could not differentiate between the initial and final velocities in their substitution into the appropriate equation $F_{net} \Delta t = m \Delta v$.

Suggestions for Improvement

(a)   Expose learners to many different scenarios or problems that include the application of Newton's Third Law, the principle of conservation of linear momentum and the impulse-momentum theorem. Teachers should also integrate topics (as and when necessary) in their teaching rather than only teaching topics in isolation. Moreover, they should expose learners to problems that integrate the application of different concepts.

(b)   Use the data sheet and formula sheet throughout the year.

(c)   The difference between momentum and change in momentum should be made clear during teaching.

QUESTION 5: WORK, ENERGY AND POWER

Common Errors and Misconceptions

(a)   Some candidates could not properly define conservative force, while some omitted keywords in their definition, e.g. omitting the word 'work' and using 'force' instead of 'work'.

(b)   Many candidates could not differentiate between a conservative force and a non-conservative force acting on the object.

(c)   Many candidates wrote a direction for work done on an object, which is a misconception since work done is a scalar quantity.

Suggestions for Improvement

(a)   Carefully selected examples and assessment tasks must be used to facilitate the understanding of why certain forces are classified as conservative or non-conservative.

(b)   Use *PhET* simulations to assist learners in the identification of forces acting on objects.

(c)   Learners should know that work done by a force is always equal to a change in energy, e.g. $W_{net} = \Delta K$, $W_{nc} = \Delta U + \Delta K$, $W_g = -\Delta U$.

(d)   When using $W_{nc} = \Delta U + \Delta K$ or $W_{net} = \Delta K$, learners must draw a free-body diagram to identify the forces acting in the direction of motion to know how many forces are causing the net work to be done. Emphasise that Δ implies: final – initial.

(e)   Teachers should emphasise the frame of reference in calculating potential energy, i.e. what is the position at which the potential energy is given a zero value? Is the object's potential energy decreasing or increasing?

QUESTION 6: DOPPLER EFFECT

Common Errors and Misconceptions

(a)   A number of candidates could not interpret the graphs in terms of wavelength, period and frequency correctly.

(b)   Many candidates struggled to differentiate between the concepts 'period', 'frequency' and 'time'.

(c)   Many candidates used the equation $E = hf$ to calculate the frequency of the waves and also confused f_s with f_L.

Suggestions for Improvement

(a)   Teachers need to source and expose learners to a variety of questions relating to the Doppler effect equation, as the scope is very broad, given the number of variables in the equation.

(b)   Revise the use of the wave equation: $v = f\lambda$, and period equation $T = \dfrac{1}{f}$.

(c)   There is a **need for** teachers to emphasise the progression of knowledge. The work done in Grade 12 cannot be seen in isolation from work done in Grades 10 and 11.

QUESTION 7: ELECTROSTATICS (COULOMB'S LAW AND ELECTRIC FIELDS)

Common Errors and Misconceptions

(a)   Candidates failed to recall that 'like charges repel', hence the repelled sphere should have been positive.

(b)   Many candidates omitted the force of gravity in their free-body diagram.

(c)   Candidates also confused Coulomb's Law with Newton's Law of Universal Gravitation.

(d)   Candidates swopped/mixed the formulae for E and F; i.e. $E = \frac{F}{q}$ and $E = .\frac{kQ}{r^2}$.

(e)   Many candidates failed to realise that the forces acting on the sphere are in equilibrium and a closed vector diagram would have assisted them in calculating the tension in the string.

(f)   Candidates did not use the absolute value of the charges when substituting in the formula of Coulomb's Law or the electric field at a point.

Suggestions for Improvement

(a)   Teachers need to emphasise 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. $= \frac{F}{q}$ and $E = .\frac{kQ}{r^2}$.

        It is important that learners understand which charge 'q' and 'Q' refer to in each of these formulae.

(c)   Expose learners to vector diagrams (1D and 2D) and vector triangles when determining the resultant of forces (e.g. electrostatic, gravitational and tension) acting on a body and net electric fields.

QUESTION 8: ELECTRIC CIRCUITS

Common Errors and Misconceptions

(a)   Many candidates were not scientifically correct in defining the emf of a battery as keywords were omitted in their definitions.

(b)   Many candidates omitted the units in the final answer.

(c)   Candidates do not have a clear understanding of the relationship between potential difference V, current I, resistance in the circuit when using the equation . $\varepsilon = Ir + IR = V_{internal} + V_{external}$.

(d)   The influence on $V_{external}$ in the presence of $\mathbf{r_i}$ when there is a change in the total resistance in the circuit is still a problem for many candidates.

(e)   Learners are unable to substitute the correct values of R, V and I when applying the formula $R = \frac{V}{I}$ to the whole circuit or to parts of a circuit.

Suggestions for Improvement

(a)   Although the principles of series and parallel circuits are taught from Grade 9, the basic principles have to be revised and practised constantly. The critical features of series and parallel circuits should be reinforced.

(b)   Use *PhET* simulations to demonstrate the relationship between V_{ext} and V_{int} , as well as the effect of adding resistors in series and parallel.

(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.

(d)   Learners need to understand the formula $R = \dfrac{V}{I}$ and be able to substitute the correct values of R, V

and I when applying the formula to the whole circuit or to parts of a circuit.

QUESTION 9: ELECTRODYNAMICS

Common Errors and Misconceptions

(a)   Many candidates had difficulty in explaining that for an emf to be induced, there must be a change in the magnetic flux linked to the coil.

(b)   Many candidates still omit the subscripts rms and ave in the equations:

$$P_{ave} = V_{rms}I_{rms}, \quad P_{ave} = I^2_{rms}R, \text{ and } \quad P_{ave} = \dfrac{V^2_{rms}}{R} \; .$$

(c)   Candidates could not differentiate between a DC and an AC source.

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 10: PHOTOELECTRIC EFFECT

Common Errors and Misconceptions

(a)   Many candidates omitted keywords in the definition of the photoelectric effect.

(b)   Candidates did not realise that they had to use the graphing skills to determine the work function of the metal and the mass of the photo-electron, i.e. the y-intercept in the given graph is the work function and the gradient of the graph represented the mass of the photo-electron.

(c)   In Q10.4 the calculation of X was well attempted by many candidates. Common errors were:

•   Omitting the subscript max in the formula: $E = W_0 + K_{max}$.

•   Incorrect mathematics in the calculation.

(d) Most candidates did not know that a change in intensity of light will affect the number of photo-electrons emitted per unit time.

Suggestions for Improvement

(a) Teachers should use computer simulations (e.g. *PhET*) when teaching the photoelectric effect. This will assist in improving learners' understanding of the concept.

(b) Learners should be given a variety of problem-solving exercises at cognitive levels 3 and 4 for both classwork and homework.

(c) Questions on new situations, where interpretation of graphs is required, should be compiled and provided to the learners on photoelectric effect. Also use graphs to highlight concepts, such as 'work function' and 'threshold frequency'.

11.5 OVERVIEW OF LEARNER PERFORMANCE IN PAPER 2

General Comments

(a) Although the multiple-choice questions in Q1 were answered well in general, those pertaining to chemical equilibrium, acids and bases, galvanic cells and electrolytic cells were answered poorly.

(b) Q9 on electrolytic cells and the use of the Table of Standard Reduction Potentials was answered poorly. Teachers are advised to give learners more tasks on how to use the table to determine the oxidising agent, reducing agent, oxidation and reduction in given redox reactions and how to explain their choice.

(c) Most candidates had a poor understanding of Le Chatelier's principle, resulting in poor performance in Q6. Those who applied the principle correctly often failed to explain their choice correctly using the principle.

(d) Questions pertaining to pure recall of content showed that learners memorise definitions without understanding resulting in using words haphazardly. 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.

(e) Grade 11 work (Stoichiometry) is still poorly understood. Grade 11 work should be included in classwork, homework and tests in Grade 12.

(f) The Table of Standard Reduction Potentials (Q8 and Q9) 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 to decide which substance will be oxidised and which one will be reduced. It is evident that candidates have a misconception that a weaker reducing agent is a strong oxidising agent. Teachers need to assist learners to understand that a weaker reducing agent is, in fact, not a strong oxidising agent.

(g)   Learners should be taught that, for example, Na can never be an oxidising agent because it cannot undergo reduction (gain electrons). Oxidising agents are listed on the left in the Table of Standard Reduction Potentials and reducing agents on the right (see the section of Table 4B below). Time should also be spent on the approach to follow when explaining in terms of relative strengths of reducing or oxidising agents

Section of the TABLE OF STANDARD REDUCTION POTENTIALS (4B)

Most negative reduction potential
Weakest oxidising agent

Most positive reduction potential
Strongest oxidising agent

Reaction		$E^\ominus$
$Ni^{2+} + 2e^- \rightleftharpoons Ni$		$-0,27$
$Sn^{2+} + 2e^- \rightleftharpoons Sn$		$-0,14$
$Pb^{2+} + 2e^- \rightleftharpoons Pb$		$-0,13$
$Fe^{3+} + 3e^- \rightleftharpoons Fe$		$-0,06$
$2H^+ + 2e^- \rightleftharpoons H_2(g)$		$0,00$
$S + 2H^+ + 2e^- \rightleftharpoons H_2S(g)$		$+0,14$
$Sn^{4+} + 2e^- \rightleftharpoons Sn^{2+}$		$+0,15$
$Cu^{2+} + e^- \rightleftharpoons Cu^+$		$+0,16$
$SO_4^{2-} + 4H^+ + 2e^- \rightleftharpoons SO_2(g) + 2H_2O$		$+0,17$
$Cu^{2+} + 2e^- \rightleftharpoons Cu$		$+0,34$
$2H_2O + O_2 + 4e^- \rightleftharpoons 4OH^-$		$+0,40$
$SO_2 + 4H^+ + 4e^- \rightleftharpoons S + 2H_2O$		$+0,45$

Most negative reduction potential
Strongest reducing agent

Most positive reduction potential
Weakest reducing

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 reflect national averages accurately, 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 as a Percentage: Paper 2
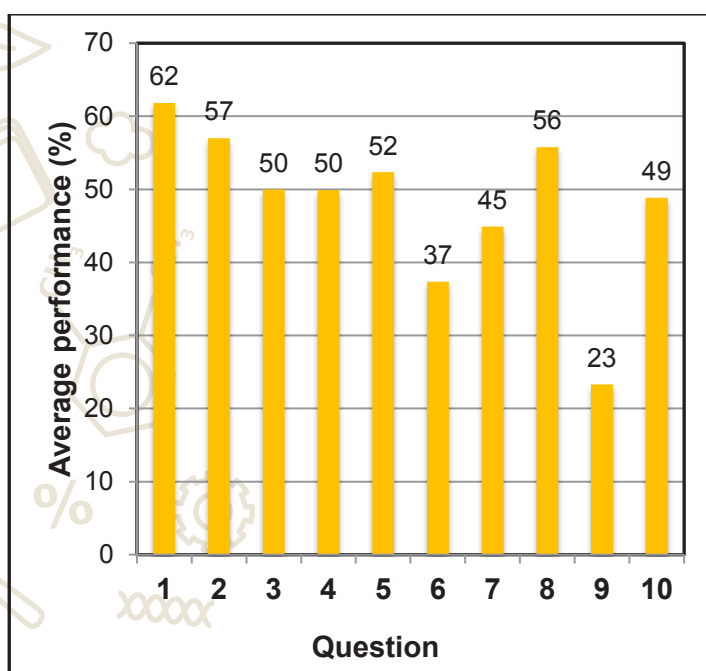
Q1	Multiple-choice questions – all topics
Q2	Nomenclature of organic compounds
Q3	Physical properties of organic compounds
Q4	Reactions of organic compounds
Q5	Reaction rate and stoichiometry
Q6	Chemical equilibrium
Q7	Acids and bases and stoichiometry
Q8	Galvanic cells
Q9	Electrolytic cells
Q10	Fertilisers

There was an improvement in performance in five questions, namely multiple-choice questions (Q1), nomenclature of organic compounds (Q2), rates of reaction (Q5), galvanic cells (Q8) and fertilisers (Q10) as compared to 2018.

Graph 11.6.2 Average Marks per Subquestion as a Percentage: Paper 2
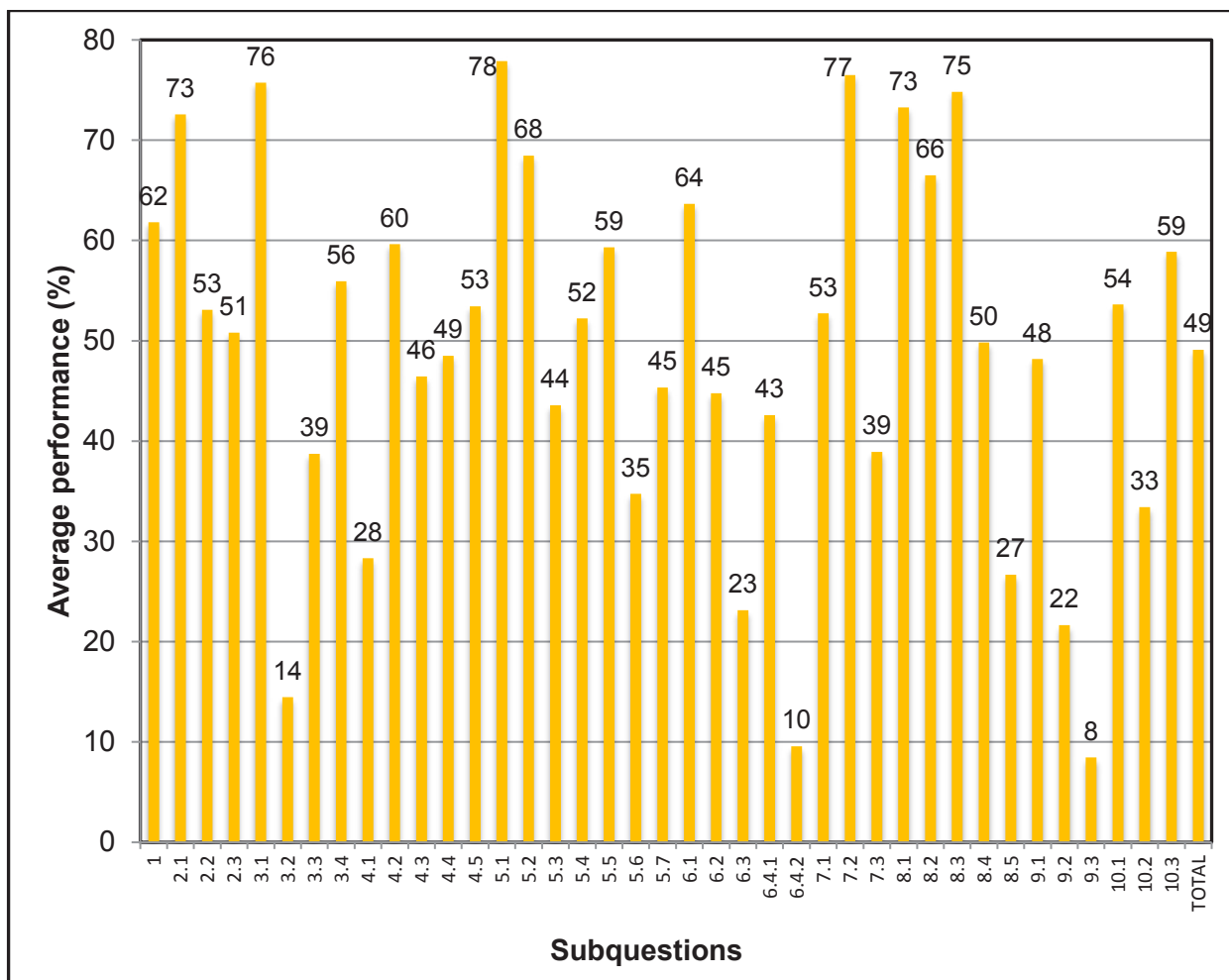
11.7 ANALYSIS OF LEARNER PERFORMANCE IN EACH QUESTION IN PAPER 2

QUESTION 1: MULTIPLE-CHOICE QUESTIONS

Common Errors and Misconceptions

(a)   Most candidates incorrectly thought that distractor B (E_a = 50 kJ·mol^{-1} & ΔH = +100 kJ·mol^{-1}) is the correct answer in Q1.4.

(b)   In Q1.5 many candidates thought that a catalyst increases the reaction rate as well as the yield of a reaction and chose A as answer.

(c)   Candidates showed poor understanding of the application of Le Chatelier's principle and the effect of equilibrium conditions on the K_c value (Q1.6). The most common incorrect answer was C, which shows that most candidates did not know that a change in pressure at constant temperature will have no effect on the K_c value.

(d)   Although most candidates could identify hydrochloric acid as a strong acid (Q1.7) and will, for the same concentration, have a higher [H_3O^+(aq)] than ethanoic acid, they failed to link a high [H_3O^+(aq)] to a low pH value and chose A as the answer.

(e)	In Q1.8 many candidates did not know how to use the given $E^{\ominus}$ values to determine which one of the two half-reactions will be the oxidation and which one the reduction.

(f)	In both Q1.8 and Q1.9 candidates showed poor understanding of the concepts 'reduction', 'oxidation', 'reducing agent' and' oxidising agent' and aspects specific to galvanic and electrolytic cells. In Q1.9 many candidates did not know that the anode is always the positive electrode in any electrolytic cell.

Suggestions for Improvement

(a)	The answering of multiple-choice questions is a skill that needs to be developed. Learners must be guided to eliminate the wrong answers through regular practice and assessment. Multiple-choice questions should be assessed on a regular basis on all topics covered.

(b)	It is advisable to compile a workbook containing multiple-choice questions from previous years per topic. These can also be used for regular short tests after completion of a topic and during review, teachers can explain how learners must approach these questions.

(c)	Learners should be taught that only a change in temperature can result in a change in the K_c value for a particular reaction. If the forward reaction is exothermic, a decrease in temperature will result in an increase in the K_c value. If the forward reaction is endothermic, an increase in temperature will result in an increase in the K_c value.

(d)	The concepts pertaining to redox reactions should be thoroughly explained and learners should be exposed to sufficient problem-solving in the use of these concepts. Oxidation and reduction are reactions, while oxidising agents and reducing agents are substances. Avoid using the words 'oxidised' and 'reduced' as one adds more confusing vocabulary. Rather limit terminology to 'oxidation', 'reduction', 'reducing agent' and 'oxidising agent'.

(e)	The meaning of reduction potentials ($E^{\ominus}$ values in Tables 4A and 4B) needs more attention in class. Learners should be taught that the values listed are reduction potentials applicable to each reduction half-reaction and gives a comparative indication of the strength of oxidising agents listed in the table. When two half-reactions are compared, the one with the more positive value has the greater tendency to be a reduction and the substance undergoing reduction is the stronger oxidising agent.

QUESTION 2: NOMENCLATURE OF ORGANIC COMPOUNDS

Common Errors and Misconceptions

(a)	Many candidates were unable to differentiate between a general formula, a structural formula and a molecular formula (Q2.1.1) and gave the structural formula or molecular formula of the alkyne as the answer. Some candidates gave the structural formula of the functional group as the answer. Many got confused with the subscripts and common incorrect answers were: CH_{2n-2}; C_nH_{2-2}; C_nH_{2n}; C_nH_{2n+1}.

(b)   When drawing the structural formula of the alkyne (Q2.1.2), many placed the triple bond between C1 and C2 instead of between C2 and C3. Other common errors were:

- More than four bonds on the C atoms of the triple bond
- Omitting H atoms
- Omitting bond lines between atoms in the structure
- Drawing condensed structural formulae for the methyl groups of the structural formula

(c)   The definition of the 'positional isomer' (Q2.2.1) was poorly answered in comparison to application-type questions. Some candidates forfeit the first mark due to the use of the words 'molecular structure' or 'general formula' or 'molecular mass' instead of 'molecular formula'. Many candidates forfeited the second mark because they did not specify that the 'functional group/substituent' will be in a different position and therefore 'same molecular formula but different positions' was a common half-correct response.

(d)   The term 'positional isomer' (Q2.2.2) was poorly understood. Many candidates wrote the IUPAC name of the compound given, i.e. 'pentan-2-one' instead of 'pentan-3-one'. Another error that frequently occurred was writing of the IUPAC name as 'pent-3-one' instead of 'pentan-3-one'.

(e)   Many candidates wrote the structural formula of another ketone (Q2.2.3) instead of that of the aldehyde. Such candidates did not understand the term 'functional isomer'.

(f)   Although most candidates could identify the alcohol as being a tertiary alcohol (Q2.3.1), many failed to give a correct reason. Common incorrect reasons were:

- The -OH group is bonded to three C atoms.
- The functional group is bonded to the third C atom.
- The C atom is bonded between three other C atoms (no reference to thefunctional group/-OH group).

(g)   Hyphens and commas are still not used correctly in IUPAC names (Q2.3.2 & Q2.3.3). Commas were used between numbers and words instead of between numbers only.

(h)   When writing the IUPAC name of the alcohol in Q2.3.2, many omitted the 'an' in butan-2-ol and a common incorrect answer was 2-methylbut-2-ol.

(i)   In Q2.3.3 many candidates could not identify the major product formed correctly and gave the IUPAC name of the minor product, 2-methylbut-1-ene, as the answer. Many did not know that the product of the elimination reaction is an alkene. The IUPAC name of an alkane (2-methylbutane) or an alkyne (2-methylbut-2-yne)   were   common incorrect answers. Some candidates added '-an' in the correct name, i.e. '2-methylbutan-2-ene' and forfeited one mark.

Suggestions for Improvement

(a)   The different types of formulae, i.e. structural, condensed structural, condensed and molecular, should be revised and assessed regularly so that learners are able to distinguish between them and to interpret given formulae.

(b)   Learners should be exposed to many exercises to practise the writing of IUPAC names and/or structural formulae of positional, functional and chain isomers of given compounds to ensure they can distinguish between the different types of structural isomers.

(c)   When writing IUPAC names, the correct use of hyphens and commas should be emphasised. The use of 'an' in, for example, IUPAC names of ketones and alcohols, but not in the IUPAC names of, for example, alkenes, should be emphasised to ensure learners do not forfeit marks unnecessary.

(d)   When drawing structural formulae, learners should be encouraged to count the number of bonds drawn around atoms to eliminate unnecessary errors, e.g. a C atom has a valence of four and should always form four bonds to other atoms.

QUESTION 3: PHYSICAL PROPERTIES OF ORGANIC COMPOUNDS

Common Errors and Misconceptions

(a)   Candidates who did not obtain full marks for Q3.1 forfeited a mark for 'temperature'. Such candidates only stated that 'it is the point (instead of temperature) when the vapour pressure of a substance equals atmospheric pressure'. Other incorrect definitions were:

- The temperature where a liquid boils
- The temperature when a vapour is in equilibrium with its liquid

(b)   Most candidates failed to give a reason why the comparison of boiling points of the three chain isomers is fair (Q3.2). The most common incorrect reasons were that 'the compounds are all alkanes or belong to the same homologous series' without mentioning that 'they have the same number of C atoms and H atoms'.

(c)   Linking the three chain isomers to the boiling points (Q3.3) was poorly attempted. Most candidates gave incomplete explanations and compared only two of the three isomers. For a full explanation, all three isomers should be compared. Common errors were:

- Making a general statement, e.g. 'the longer the chain length, the higher the boiling point', without referring to any of the compound Q, R and S.
- Referring to 'energy needed to break the bonds' (instead of 'intermolecular forces') or 'energy needed to break the intermolecular forces' between atoms (instead of 'molecules').
- Only comparing the structural differences between the three isomers without comparing 'the strength of the intermolecular forces' and 'the energy needed to overcome the intermolecular forces in each'.

(d)   Many candidates incorrectly chose the alcohol, T, as the compound having the higher vapour pressure (Q3.4.1), but explained in Q3.4.2 that the alcohol has the stronger intermolecular forces, due to hydrogen bonding. The concept 'vapour pressure' and its relationship with the strength of intermolecular forces was therefore not well understood.

In their explanations, many candidates referred to one of the weaker types of intermolecular forces present between molecules of alcohols and molecules of aldehydes and omitted the strongest intermolecular force responsible for the uniqueness of each compound. An example of such an explanation is that 'alcohols have dipole-dipole forces and aldehydes have London forces'. The forces responsible for their unique physical properties are hydrogen bonding in alcohols and dipole-dipole forces in aldehydes.

Suggestions for Improvement

(a) The relationship between strength of intermolecular forces and vapour pressure should be emphasised. Vapour pressure decreases as the strength of intermolecular forces increases.

(b) When dealing with variables, it should be emphasised that any investigation should have only one independent variable. All other variables should be controlled (kept constant) to ensure a fair comparison.

(c) In explanations of differences in boiling points, melting points and vapour pressure, the strongest intermolecular force in each of the compounds concerned should be mentioned to explain differences. For example, both alkanes and alcohols have London forces, but the intermolecular forces causing the difference in their boiling points is hydrogen bonding in alcohols and London forces in alkanes. The strongest intermolecular force in a particular compound is mainly responsible for its physical properties.

QUESTION 4: REACTIONS OF ORGANIC COMPOUNDS

Common Errors and Misconceptions

(a) Most candidates failed to interpret the flow diagram to identify the homologous series to which the unknown compound belongs as a 'haloalkane' (Q4.1). The most common incorrect response was 'alkanes'. Candidates therefore failed to use the products and the reaction conditions to work backwards to identify the unknown compound.

(b) Although well answered, the analysis of the flow diagram to identify types of reactions (Q4.2) was a challenge to some candidates. Many candidates failed to recognise the esterification (Q4.2.3) from the information given.

(c) Differentiation between the conditions for substitution (hydrolysis) and elimination (concentrated strong base), as shown in the flow diagram, was a challenge to many candidates. Although most candidates knew a concentrated base should be used to prepare the alcohol (Q4.3.1), they only stated that a 'strong base' is needed instead of a 'dilute strong base' or 'water'.

(d)   Identification of the primary alcohol (Q4.3.2) was a challenge to most candidates. They failed to use the alkene given in the flow diagram to determine that the alcohol should have three C atoms. Therefore, 'butan-1-ol' and 'pentan-1-ol' were common incorrect responses. Some of those who knew that the alcohol should have three C atoms, made one of the following mistakes:

- Omitting the position of the functional group e.g. 'propanol'

- Incorrect functional group, e.g. 'propan-2-ol''

- Omitting 'an', e.g. 'prop-1-ol''

(e)   Many candidates drew the structural formula of propan-1-ol instead of that of propan-2-ol in Q4.4. They did not apply the rule that during hydration of an alkene, the H atom bonds to the C atom of the alkene already having the most H atoms. Therefore, the -OH group should bond to the second C atom in this example. Other errors were:

- Omitting some of the H atoms in the structure

- Attaching the -OH group incorrectly to the C atom so that the H atom of the -OH group is bonded to the C atom.

(f)
    Instead of the structural formula of the ester (Q4.5.1), many candidates drew the structural formula of a carboxylic acid, such as pentanoic acid or the structural formula of a ketone. Others drew the structural formula of ethyl propanoate instead of that of propyl ethanoate.

Suggestions for Improvement

(a)
    The differences and similarities in the conditions for the substitution and elimination reactions of haloalkanes should be emphasised.
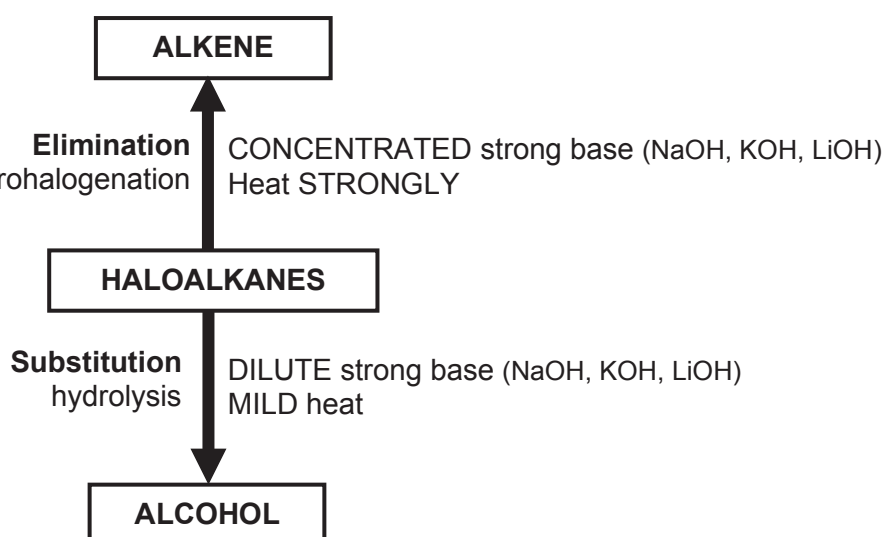
QUESTION 5: REACTION RATE

Common Errors and Misconceptions

(a)   The mark allocation contributed to the good performance in Q5.2. However, the following errors (not always penalised) occurred:

- Swapping the initial and final masses when calculating the change in mass (should be $0,25 - 2 = -1,75$ g)
- Leaving the final answer as $-0,06$ g·s^{-1} (reaction rate cannot be negative)

(b)   Very few candidates obtained full marks for the stoichiometric calculation (Q5.3). Many candidates forfeited marks for one or more of the following errors:

- Using the mass of two antacid tablets (4 g) instead of that of one tablet (2 g)

- Omitting the calculation of the mass of $CaCO_3$ using 40% of the mass of the antacid tablet

- Using the ratio between CO_2 and $HC\ell$ (1:2) instead of that between $CaCO_3$ and CO_2 (1:1)

- Using dm^{-3} or mol·dm^{-3} as the unit of volume in the final answer.

(c)   Many candidates thought that temperature is the controlled variable (Q5.4). These candidates did not interpret the graph correctly. It is clear from the graph that temperature is the independent variable.

(d)   The conclusion that can be drawn from the graph (Q5.5) was answered well. However, several candidates stated that 'as the time increases, temperature increases', whereas the graph shows the

relationship between the 'inverse of time' and 'temperature'. Many candidates did not interpret $\frac{1}{t}$ as being reaction rate.

(e)   The use of the collision theory to explain the conclusion from the graph (Q5.6) was not answered well. Most candidates forfeited marks for one or more of the following reasons:

- Stating that at a higher temperature, molecules will have higher energy instead of higher <u>kinetic</u> energy.

- Stating that 'molecules have higher kinetic energy' instead of '<u>more</u> molecules have <u>sufficient</u> kinetic energy'.

- Stating that 'more effective collisions take place' instead of 'more effective collisions <u>per unit time</u>'.

- Stating that 'effective collisions take place per unit time' instead of '<u>more</u> effective collisions per unit time'.

(f)   When drawing the curve that will be obtained for a higher concentration of acid (Q5.7), the following errors occurred:

- Starting curve Y at the same point on the y-axis as the original curve

- Drawing a curve with an initial constant gradient before the gradient increases

- Allowing the curves to cross (curve Y should always be above the original curve)

- Drawing the two curves without labelling curve Y

Suggestions for Improvement

(a) When calculating reaction rate for a reaction using the concentration of reactants, the following expression should be used: Average rate = $-\dfrac{\Delta c}{\Delta t} = -\left(\dfrac{c_f - c_i}{t_f - t_i}\right)$

(b) The concentration of reactants decreases because reactants are used and therefore $c_f - c_i$ will be negative. The minus sign ensures that a positive value is obtained for reaction rate. The concentration can be substituted by number of moles (n) or mass (m) depending on the question.

(c) When calculating reaction rate for a reaction using the concentration of products, the following expression should be used: Average rate = $\dfrac{\Delta c}{\Delta t} = \dfrac{c_f - c_i}{t_f - t_i}$.

(d) The concentration of products increases because products are formed and $c_f - c_i$ will be positive. The concentration can be substituted by number of moles (n) or mass (m) depending on the question.

QUESTION 6: CHEMICAL EQUILIBRIUM

Common Errors and Misconceptions

(a) When stating the definition of chemical equilibrium (Q6.1), many candidates omitted the word 'rate' and therefore stated that 'the forward reaction is equal to the reverse reaction'. No marks were allocated for such a statement. Other errors were:

- Chemical equilibrium is when the reactants and products are constant.

- Chemical equilibrium is when the reactants are equal to the products.

- It is when the concentrations of the reactants and products are equal.

(b) The K_c calculation (Q6.2.1) was better answered than expected. However, the way of allocating marks could have contributed to good performance in this question. Common errors were:

- No K_c expression (Note that $\dfrac{[products]}{[reactants]}$ is NOT a K_c expression.)

- Incorrect K_c expression, e.g. including the solid in the expression $K_c = \dfrac{[CO]^2}{[C][CO]}$

- Using the mass of $CO_2(g)$ given as the number of moles of $CO_2(g)$

- Using the given equilibrium concentration of $CO_2(g)$ as the number of moles of $CO_2(g)$ at equilibrium and, instead of multiplying by 3 dm^3 to obtain the equilibrium number of moles, dividing it by 3 dm^3

- Ignoring the given concentration of $CO_2(g)$ and calculating a concentration using any other value

- Adding a unit to the K_c value calculated

(c) Calculation of the minimum mass of C(s) (Q6.2.2) was answered poorly. Most candidates used the number of moles of $CO_2(g)$ at equilibrium to derive the number of moles of C(s) needed. Very few candidates used the change in the number of moles of $CO_2(g)$ that has reacted to calculate the mass of C(s) needed.

(d)   In Q6.3.1 most candidates did not know that the addition of more solid to an equilibrium mixture will not influence the equilibrium position/amount of products.

(e)   The explanation using Le Chatelier's principle (Q6.3.2) was answered poorly. Some candidates did not make reference to a choice when answering the question and therefore no marks could be allocated for their explanation. Some stated Le Chatelier's principle instead of applying the principle to the given scenario. Most candidates stated in their explanation that when pressure increases, the reaction that leads to the smaller number of moles will be favoured instead of the smaller number of moles of 'gas'.

(f)   When explaining why the reaction is endothermic (Q6.4.1), many candidates omitted mentioning that 'an increase in temperature favours an endothermic reaction'. Some candidates did not make reference to a choice when answering the question and therefore no marks could be allocated for their explanation.

(g)   Q6.4.2 was answered extremely poorly. Most candidates did not attempt the question. Some of those who answered this question, calculated a percentage from the values given in the table or added values in the table and then calculated a percentage there-of.

Suggestions for Improvement

(a)   Place more emphasis 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.

(b)   When explaining the effect of a change in temperature on the equilibrium position of a reaction, the first step should be to state how the change in temperature influences either an exothermic or an endothermic reaction. For example, if the percentage of products increases with an increase in temperature, candidates should state that 'an increase in temperature favours an endothermic reaction' to conclude that the forward reaction is endothermic.

(c)   Teachers should avoid the use of $K_c = \dfrac{[\text{products}]}{[\text{reactants}]}$ in class. Use chemical equations to teach the writing of K_c expressions.

(d)   Teachers should remind learners to write down their choice of option when asked to do so in a question, e.g. Q6.3.2 and Q6.4.1.

QUESTION 7: ACIDS AND BASES

Common Errors and Misconceptions

(a)   Many candidates thought that HBr is a weak acid (Q7.1). Most of those who identified HBr as a strong acid stated the definition of a strong acid (completely ionised) as the reason for the answer. No reference was made to the K_a value, which is greater than 1, giving the impression that they guessed the answer. A common incorrect reason given by some was that 'HBr is a strong acid because it is incompletely ionised'.

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(b)   Although Q7.2 was answered well, some candidates forfeited marks due to the omission of the charge of Br^-.

Common errors made in the pH calculation (Q7.3) were:

- Incorrect conversion from cm^3 to dm^3.

- Using an incorrect ratio, e.g. $n(HBr) = \underline{2}n(NaOH)$

- Mixing the pH and pOH formulae, e.g. $pH = -log[OH^-]$ or $pH = -log[H_3O]$ or $pH = -log(H_3O^+)$

- Writing the pH formula as $pH = -log[HBr]$

- Omitting the pH formula and just starting with $pH = -log(0,092)$

- Using $K_w = [H_3O^+][OH^-] = 1 \times 10^{-14}$ to calculate $[H_3O^+]$ after substituting the concentration of NaOH as $[OH^-]$

(c)   Many candidates did not attempt Q7.4, while very few of those who answered the question obtained full marks. Most candidates calculated the initial number of moles of HBr and then equated that to the number of moles of $Zn(OH)_2$ that has reacted. The step in which the number of moles of HBr that reacted with the $Zn(OH)_2$ had to be calculated, i.e. $n(HBr)_{reacted} = n(HBr)_{initial} – n(HBr)_{reacted\ with\ NaOH}$, was omitted and such candidates forfeited two marks for this step as well as the mark for the answer. Other errors were:

- Using an incorrect molar mass for $Zn(OH)_2$

- Using an incorrect formula e.g. $n = \dfrac{c}{V}$ or using when calculating $n = \dfrac{V}{V_M}$.

- Incorrect or no conversion from cm^3 to dm^3 when substituting volumes into $c = \dfrac{n}{V}$

Suggestions for Improvement

(a)   Although $HC\ell$, H_2SO_4 and HNO_3 are listed as examples of strong acids, candidates should be made aware that there are other strong acids as well. Candidates should be taught how to use given K_a values to determine whether an acid is strong or weak.

(b)   Candidates should be taught to copy formulae from the data sheet. It is inexcusable to forfeit three marks due to an incorrect pH formula.

(c)   Ensure that stoichiometric calculations are taught properly in Grade 11. Expose candidates to stoichiometric calculations involving limiting reagents from the beginning of their Grade 12 year to give them enough practice.

QUESTION 8: REDOX REACTIONS AND GALVANIC CELLS

Common Errors and Misconceptions

(a)   Although Q8.1 was answered well, some candidates thought that 'chemical energy is transferred to mechanical energy', while others stated the energy conversion in an electrolytic cell, i.e. 'electrical energy to chemical energy'.

(b)   A common error made when writing the function of the salt (Q8.2) was stating that 'the salt bridge completes the cell', or 'the salt bridge is a pathway for the electrons to move'. Candidates also refer to the salt bridge as 'maintaining neutrality of the electrons'.

(c)   The calculation of the cell potential (Q8.3) was answered well in comparison to the other subquestions. Many learners identified metal **X** as Pb^{2+}, which is an ion of the metal. Others identified metal **X** as $Pb \rightarrow Pb^{2+} + 2e^-$ or $Pb^{2+} + 2e^- \rightarrow Pb$ instead of Pb. Common errors when doing the calculation were:

- Using abbreviations in the formula, e.g. $E_{cell} = E_{red} - E_{ox}$ or $E_{cell} = E_{oxidising} - E_{reducing}$

- Using $E = cathode - anode$ as formula

- Swapping the reduction potential of the anode with that of the cathode when substituting

- Using Pt as the active electrode in the cathode half-cell and thus substituting the reduction potential of the Pt^{2+}/Pt half-reaction instead of that of the $C\ell_2/C\ell^-$-half-reaction as $E_{cathode}$

(d)   In Q8.5.1 many candidates reasoned that 'the reactants are used up' or 'the cell is flat' or 'the rates of the oxidation and reduction half-reactions become zero' instead of stating that 'the cell reaction reached equilibrium'.

(e)   Although many candidates knew that the voltmeter reading will increase when $AgNO_3(aq)$ is added to the chlorine half-cell (Q8.5.2), they failed to use Le Chatelier's principle to provide an explanation for the increase in voltmeter reading. Many merely stated Le Chatelier's principle instead of using the principle.

Suggestions for Improvement

(a)   Concepts such as 'reducing agent', 'oxidation', 'oxidising agent' and 'reduction' should not only be memorised, but learners should have a thorough understanding of these concepts and be able to identify, for example, the reducing agent in a particular reaction. Regular assessment on this identification is needed to ensure that learners fully understand these concepts.

(b)   Learners should be taught how to use the Table of Standard Reduction Potentials to identify the reducing agent, oxidising agent, reduction half-reaction and oxidation half-reaction in a galvanic cell. Regular assessment on this identification is needed to ensure learners understand the use of the Table of Standard Reduction Potentials.

QUESTION 9: ELECTROLYTIC CELLS

Common Errors and Misconceptions

(a)   In Q9.1 candidates did not know the difference between 'electrolysis', an 'electrolytic cell' and an 'electrolyte'. Some candidates wrote that electrolysis is a solution in which electrical energy is converted to chemical energy.

(b)   Very few candidates obtained full marks for the reduction half-reaction that takes place at the cathode during the electrolysis of a concentrated sodium chloride solution (Q9.2.1). A variety of incorrect reduction half-reactions were used of which the most common were $2C\ell^- + 2e^- \rightarrow C\ell_2$ and $H_2O_2 + 2H^+ + 2e^- \rightarrow 2H_2O$. Many used a double arrow in the correct half-reaction.

(c)   Identification of the oxidising agent (Q9.2.2) was answered poorly. Many identified H_2 as the oxidising agent.

(d)   The use of the Table of Standard Reduction Potentials to explain why sodium ions will not be reduced during electrolysis (Q9.3) was a challenge to most candidates. They had a poor understanding of concepts such as 'oxidising agent', 'reducing agent', 'oxidation' and 'reduction'. Common errors were:

- Na^+ is a stronger reducing agent than H_2O and will be oxidised.

- Na^+ ions are spectator ions.

- Na^+ cannot be reduced because its $E^\ominus$ value is below zero.

- Comparing Na or Na^+ to $C\ell^-$ instead of to H_2O.

- Rewriting the statement in the question paper, i.e. Na^+ ions will not be reduced.

Suggestions for Improvement

(a)   The difference between the definitions of 'electrolysis', an 'electrolytic cell' and an 'electrolyte' should be emphasised. Although there is a similarity in that the definition of both electrolysis and an electrolytic cell contains 'electrical energy is converted to chemical energy', there is a difference in that electrolysis is a process, while an electrolytic cell is a cell in which the energy change takes place. An electrolyte is a solution that conducts electricity through the movement of ions.

(b)   Candidates 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 $NaC\ell$, electrolysis of concentrated $CuC\ell_2$, the aluminium cell, an example of a cell used for electroplating and the purification of copper.

(c)   When copying either the oxidation or the reduction half-reaction from the Table of Standard Reduction Potentials, single arrows should be used to represent either the oxidation or the reduction.

QUESTION 10: FERTILISERS

Common Errors and Misconceptions

(a)   The interpretation of the flow diagram to identify gas X (Q10.1.1), acid Q (Q10.1.2) and gas Y (Q10.1.2) was poorly attempted. In Q10.1.2 'nitrogen oxide' instead of 'nitrogen monoxide' was a common incorrect answer.

(b)   Identification of the type of reaction (Q10.2.1) was answered poorly. The 'catalytic oxidation of ammonia' is a specific reaction in the Ostwald process and the question is actually a recall question. Incorrect answers were 'addition', 'substitution', 'elimination' and 'combustion'.

(c) The balanced equation (Q10.2.2) for the reaction of ammonia (compound P) and HNO_3 (acid Q) was answered poorly, possibly because candidates failed to identify compound P and acid Q in the flow diagram.

(d) In the calculation in Q10.3.2, many candidates omitted one of the steps to arrive at the mass of P in each bag. Common errors were:

- Incorrect use of the NPK ratio e.g. $\dfrac{3}{21}$ or $\dfrac{4}{8}$ instead of $\dfrac{3}{8}$

- Drawing a conclusion based on percentage of phosphorous in each bag without taking into account the masses of the bags, e.g. $\dfrac{3}{8}$ x 21 = 7,9% and $\dfrac{3}{8}$ x 27 = 10,1%, therefore bag B has the most phosphorous

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) Ensure learners understand the meaning of numbers given on a fertiliser bag and how to use them in calculations to prevent them from substituting those numbers haphazardly.