National Senior Certificate 2020 DIAGNOSTIC REPORT

PART 1: CONTENT SUBJECTS





basic education

Department: Basic Education **REPUBLIC OF SOUTH AFRICA**







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Foreword from the Minister

At the heart of a successful education system, is a credible public examination system built on the foundations and pillars of integrity. It must enjoy respect and be acknowledged as such by higher education institutions, employers and our people. The National Senior Certificate has stood the test of time and after 12 years of teaching and learning, this qualification has intrinsic value for both individuals and society.

The year 2020 will go down in history as one we faced unprecedented in which challenges that affected every facet of human life. The Class of 2020 sat for the Senior National Certificate (NSC) examinations in a year that the world was held to ransom by the Covid-19 pandemic. When this cohort commenced with their exit vear of the NSC, no one would have imagined the challenges that they faced.

The pandemic did not derail the Department of Basic Education and Public Examinations from its primary objective to deliver quality education and credible examinations. In 2020, our aim was to rescue the education sector from ruins that this virulent pandemic has caused. We have taken extraordinary measures to combat and manage the spread of the epidemic in our sector. We adopted a staggered approach for the reopening of schools to avoid congestion and observe the novel social distancing. Our strategy to rescue the 2020 academic year is predicated on curriculum trimming for all grades, except Grade 12. The full curriculum coverage for Grade 12s aims to ensure that the exit qualification of the Class of 2020 enjoys the same status as the previous cohorts.



Although the Class of 2020 did not attain a better pass rate than the Class of 2019, it must be acknowledged that despite a very this cohort exceeded difficult vear. expectations. If the achievements of different cohorts over the past decade are considered, it is evident that the standard and quality of the public examinations system is stabilising. The proficiency of our education system is confirmed by the fact that the achievements in gateway subjects have been on par over the past five years.

The 2020 National Diagnostic Report on Learner Performance serves as an allinclusive study and detailed analysis of candidates' performance in the NSC examinations. This report is in its tenth year of publication. Initially, the report only focused in the gateway subjects but since 2018 diagnostic reports are also offered in home languages, technologies and technical subjects. This year we also include reports for Afrikaans First Additional Language and Engineering Graphics and Design (EGD). This Diagnostic Report provides teachers, subject advisors, curriculum planners and social partners with insight into learners' performance in the targeted subjects.

This diagnostic report is therefore presented in three parts. Part 1 comprises the diagnostic reports of the ten gateway subjects. Part 2 contains the diagnostic reports for English First Additional Language, the twelve home languages and Afrikaans First Additional Language. Part 3 includes the diagnostic reports for technical subjects, technologies and EGD. In the 2020 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 and qualitative analysis of learners' responses are given for English First Additional Language. A detailed gualitative analysis of learners' responses to questions is given for each of the home languages in Part 2 and Part 3 for each of the technical subjects and technologies.

One of the key objectives of the diagnostic report is to improve the quality of teaching and learning. The quantitative and qualitative analysis of learner performance in the November 2020 examinations serves to identify the strengths and weakness in candidates' knowledge and skills. In response to weaknesses identified, the report further suggests remedial measures that should be adopted at school level. This will allow 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.

It is imperative that a diagnostic analysis is done of learners' performance by teachers after the completion of each assessment task. The outcome of an analysis of the performance of learners in informal and formal assessment tasks can serve to devise intervention strategies to improve learners' understanding of subject matter. Teacher mediation of a diagnostic analysis of performance is a pivotal component in addressing gaps in learning.

The efforts invested into the Class of 2020 culminated in their achievements. I am confident that, despite the myriad of challenges Covid-19 posed by the pandemic, the DBE and all its warriors in education. will, through effective interventions, such as this diagnostic report, achieve a positive impact on learner performance in 2021. The Xitsonga saying, 'Dyondzo I xitlhangu xa vutomi' is forever true. Roughly translated, 'Education is the shield of life'. I therefore invite all education stakeholders and the broader South African public to get involved in the DBE's efforts to fight the battle to improve lives and livelihoods through quality basic education.

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MRS AM MOTSHEKGA, MP MINISTER OF BASIC EDUCATION 22 FEBRUARY 2021



CHAPTER 1

INTRODUCTION

1.1. INTRODUCTION, SCOPE AND PURPOSE

The Class of 2020 is the seventh cohort to sit for the NSC examinations based on the CAPS. In line with past reports, the 2020 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, Afrikaans First Additional Language, English First Additional Language, the twelve official home languages, the Technologies, Technical subjects and Engineering Graphics and Design. It is essential that the 2020 diagnostic report should be used in conjunction with the 2015 to 2019 diagnostic reports. Key subject didactic principles and content matters addressed in past reports, along with the revised Annual Teaching Plans, can be used fruitfully in the classroom in 2021.

Post the marking process, the chief markers, internal moderators and subject specialists compiled 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 2016 to 2020. 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 2020 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. The Covid pandemic exacerbated the poor performance of the learners, as the gaps widened, particularly for learners who had no access to schooling during this period. 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. Progress or lack thereof, in the said areas, should determine the extent to which further interventions are necessary in 2021. 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 2021. 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. 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 (2016 – 2020)

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 2020 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 refers to generic areas of good performance or weakness and the possible reasons for these observations.

Section 3: Diagnostic question analysis

This includes the following:

- A graphical representation of the average percentage marks obtained per question;
- An analysis of the performance of learners in each specific question, stating whether the question was well answered or poorly answered (and the reason);
- Common errors and misconceptions that were identified in candidates' responses;
- 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 2020 NSC question papers since 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 2021; develop strategies for differentiated learning and provide a frame of reference for the development and design of school-based assessment during 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 2020 examination papers. While further quantitative data would have been useful in providing feedback for 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 2020 diagnostic reports for the ten key subjects covered in this publication (Part 1), indicate that the pass rate has improved in three of these subjects (Business Studies, History and Mathematical Literacy) at the 30% levels. The pass rate has however declined to varying degrees at the 30% level in the remaining key subjects. The pass rate for English First Additional Language increased at both the 30% level and at the 40% level. In the home languages (Part 2) the pass rate remained the same in six home languages (Afrikaans, English, IsiNdebele, Sepedi, SiSwati, SASL HL), remained the same in Setswana and Tshivenda and declined to varying degrees in four home languages (isiXhosa, isiZulu, Sesotho and Xitsonga).

After seven 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 CAPS, is considered to be stabilising.

It is imperative that we reflect on and learn from the performance of candidates of the 2020 NSC examinations.

The following areas of concern were identified in past diagnostic reports and they are, once again, highlighted as concerns in the 2020 NSC examinations.

- There was a general observation that not all topics were equally covered in preparation for examinations. This was particularly noticeable in centres where learners had no access to schooling during the lockdown and extended school holidays in 2020. It is essential that all prescribed topics in CAPS are studied and that there is adherence to the examination guidelines.
- In the languages, it was noticed that candidates were not familiar with the formats of transactional texts. It is advised that teachers revise the required formats on a regular basis throughout the academic year. 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. This pertains to all grades and all subjects. A few suggestions to encourage writing in schools is to launch a letter writing competition, establish a school newspapers and allow learners to write articles etc.
- In most home languages, most 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.
- Schools are encouraged to initiate reading projects/reading periods/vocabulary/dictionary exercises to expand learners' vocabulary. In 2020, it was noted that many candidates did not understand the vocabulary used in questions, extracts and comprehension texts. 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.

- SASL HL, Technical Sciences, Technical Mathematics and the Technologies were offered for the fourth 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 topics in new subjects. In SASL HL, it was observed that candidates did not give sufficient responses in the writing papers and literature. It is imperative that literature needs to be studied in detail and candidates need to be familiarised with the register, style and conventions for transactional writing texts.
- A large percentage of candidates displayed a limited understanding of subject matter, and specifically complicated topics. This was exacerbated by the lack of access to on-site teaching during the lockdown period. The 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 2015 to 2020

The diagnostic reports published from 2015 to 2020 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 2021 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. 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 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

As the 2021 cohort of Grade 12s had an interrupted Grade 11 year in 2020, it is imperative that integrated intervention strategies are used to address gaps in teaching and learning. Such strategies could include:

- At the start of the academic year, teachers should provide the learners with the topics to be covered during the year and the relevant websites, per topic.
- 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.
- Learners who cannot log on to digital portals could be issued with DVDs, with the information from various websites. Hard copies of the information should be provided to learners who do not have access to electricity and/or technology. This is particularly important as the pandemic has highlighted the great divide between those who have online access and those who do not.
- Teachers from different schools in each circuit or district could collaborate to support one another in mediating challenging topics to learners.
- Challenging topics must be revisited regularly during the academic year, through extension activities and they should form the basis of all extra classes. Stronger candidates can be paired with weaker candidates to complete assignments on challenging topics.

- Online study groups could be formed to facilitate revision activities and examination preparations through platforms such as Microsoft Teams.
- 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**

1.6.1 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.

1.6.2 Subject Advisors and district officials

- Subject specialists should do a baseline assessment of the 2021 Grade 12 cohort, to establish the impact that the pandemic had on teaching and learning during 2021, in terms of Grade 11 content coverage.
- It is also important that subject advisers emphasise that the Revised Annual Teaching Plan reflects the minimum requirements of the subject.
- Subject advisers are encouraged to convene meetings/workshops (on online platforms or in groups that adhere to Covid-19 protocol) 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 Revised 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.
- Subject Advisers should direct teachers to websites that will enhance teaching and learning.

1.6.3 Teachers

- With the pandemic still posing a threat to normal schooling, teachers should ensure that learners are provided with adequate resources to facilitate self-regulated learning.
- 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 2020 NSC Accounting examination marks the first year of the move to two 2-hour papers of 150 marks each. The two papers reflect two Accounting disciplines:

- Paper 1: Financial Reporting and Evaluation
- Paper 2: Managerial Accounting, Internal Auditing and Control

The following report should be read in conjunction with the Accounting P1 and P2 question papers for the November 2020 examination.

2.1 **PERFORMANCE TRENDS (2016–2020)**

Enrolment for the 2020 Accounting examination reflected an encouraging increase of 12 657 candidates when compared to that of 2019. The number of candidates achieving marks at both the 30% and 40% levels reflect significant improvement. The relevant percentage scores at both levels also indicate that the progress reported in recent years has generally been maintained, while the rise in the number of distinctions to 6,2% is also very pleasing.

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
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
2020	92 767	70 014	75,5	49 103	52,9

Table 2.1.1 Overall achievement rates in Accounting

The decision to move to two papers seems to have been well received by the 2020 Accounting cohort. This is due to two factors:

- **Reduction in time-management pressure**: The two papers combined provide 4 hours for completion of a 300-mark examination as opposed to the previous norm of 3 hours.
- **Distribution of content over two days**: The decision to write the two papers on different days enables candidates to focus their last-minute preparations for each day on only 50% of the curriculum.

Intervention strategies by teachers, subject advisors and various professional bodies continue to benefit the prospects of average or less-confident candidates, by focusing particularly on challenging topics as well as aspects of the curriculum that are more easily accessible to them.



Graph 2.1.1 Overall achievement rates in Accounting (percentage)

Graph 2.1.2 Performance distribution curves in Accounting (percentage)



2.2 OVERVIEW OF LEARNER PERFORMANCE: PAPERS 1 AND 2

The comments below represent an overview of the advice given to Accounting teachers in previous diagnostic reports. Teachers are once again advised to refresh and adjust their strategies by referring to previous editions of these reports. Although the final examination is now split into two papers, the advice contained therein remains relevant, and must be aligned to the specific topics for each paper.

General comments

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

- Intervention initiatives during the very challenging academic year must be commended. The good quality of responses of candidates at many centres is evidence that teachers have planned well and have implemented strategies proposed in previous diagnostic reports. A large percentage of candidates were proficient in addressing the requirements of sub-questions. They made appropriate use of the relevant information presented and managed their time well, having an extra 30 minutes per paper, when compared to previous years.
- On the other hand, the inability of weaker candidates to deal effectively with even the less challenging parts of questions is a clear indication of weaknesses in the teaching and learning process. All questions are designed to be accessible to all candidates, at least in part. If basic concepts, formats and procedures are not being addressed at an early stage, this will impact negatively on overall learner performance.
- (b) **Policy documents and LTSM:** Every teacher must be in possession of the revised *CAPS* documents, the latest *Examination Guidelines*, Annual Teaching Plans, relevant textbooks, study guides and publications such as *Mind the Gap*. These form the foundation for the planning process and must be used to monitor and support progress on an on-going basis.
- (c) **Use of past NSC papers:** Past NSC papers, as a teaching and learning resource, must be incorporated in the planning process. Every learner must have access to NSC papers, especially from 2014 onwards, as these are based on the current *CAPS* content. NSC Accounting question papers have strived to cover all topics outlined in the *CAPS* and, as such, provide a reliable source on questioning patterns and style. Innovative and creative questions are being introduced as part of the higher-order component. This ensures that the subject remains relevant and reflects modern trends. The migration to two papers did not necessitate any changes to the content or the annual teaching plans (ATP). Teachers and candidates are expected to familiarise themselves with the specific content of each paper, and extract the relevant questions from the many past examination question papers when preparing for examinations.

(d) Pertinent factors from previous diagnostic reports

Poor results in many centres have exposed challenges in teaching and learning during the academic year. The impact of the Covid-19 pandemic is also recognised as a contributing factor. However, an analysis of examination scripts and results revealed the following reasons for poor performance across both papers:

• **Poor mathematical and arithmetical ability:** Arithmetical calculations, such as percentages and ratios, feature across all topics. This includes the correct use of

rands or cents, positive or negative 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. Weaker candidates tend to provide incomplete or unclear responses to questions requiring explanations or comments. They often quote the commonly used clichés found in previous marking guidelines in situations where they may not be relevant.
- **Inability to identify relevant information to answer specific sub-questions:** The structure of an Accounting question will list the *required* first, followed by the *information* needed to answer the questions. Extracting the relevant information is a skill that is developed over time, through constant practice. Weaker candidates find this challenging, often using inappropriate figures and providing 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: Vital aspects and topics from the previous grades must be constantly reinforced at Grade 12 level. Tight time frames in Grade 12 do not allow for complete reteaching; teachers must factor such revision topics into their teaching plans and intervention programmes. This can often be done while simultaneously introducing the Grade 12 topics. The informal assessment programme can also be effectively used to enhance prior knowledge. It will be very frustrating for weaker candidates to move into more complex content if the basics are not clearly understood.
- Lack of formative testing: An informal assessment programme to support the formal assessment activities is recommended. Regular formative tasks or tests must be used to build confidence in all topics provided these are skilfully designed to lead learners to the realisation that their marks can improve. Less challenging sub-questions ('appetisers') of each question in the NSC Accounting question papers can be used as 'confidence-boosters' in this regard.

General suggestions for improvement

A recent trend is that the planning process has shifted to subject specialists at district and provincial levels. This trend has its downside. Structured Annual Teaching Plans are mediated to all teachers; this also includes a common school-based assessment programme. Teachers are then expected to deliver and monitor their progress around these plans. However, teachers are confronted with their unique classes of Grade 12 candidates who will present needs and challenges that are different from the norm. Teachers consequently have a vital duty in adapting the teaching and learning process accordingly. It is advised that they build the following practices into their work plans:

- (a) **Comments, explanations and evidence:** The issue of language across the curriculum (LAC) must be given special attention in addressing language barriers.
 - Learners must be encouraged to offer explanations that are concise, to the point and relevant to the answering of the question. Often poor or incorrect answers result from learners repeating the specific requirements of the questions in their responses.

- Although questions will often require figures or other evidence to be quoted from the information provided, language proficiency should not be viewed as an obstacle in presenting appropriate responses.
- Teachers should find time to adopt the practice of interpreting and analysing a structured examination question with their classes at strategic times during the academic year. This should be done as follows: (1) Read each word of the instruction and underline the words. (2) Identify where the relevant source information is placed in the information provided. (3) Get learners to explain what they must do to answer the question. This can also be achieved by making short video clips which learners can engage with in their own time and at their own pace.
- Partial, simple or single-word responses will not be sufficient if an explanation is required. Learners must also be made to realise that unnecessary lengthy explanations are time-consuming and will not earn additional marks.
- (b) **Time management:** Examination questions provide time guides, and learners must practise the skill of adhering to the suggested time allocations. Training on time management must be an ongoing process and must apply to all summative activities, controlled tests and examinations. Effective use of the Answer Book is also a time-management strategy. The mark allocation is a good indicator of the amount of information needed.
- (c) **Appropriate use of the printed answer book:** Learners must be made aware that the answer book is not the question paper and it should not be relied upon to replicate all aspects of the questions. Learners must comply with the requirements of each question as it is stated in the question paper. The answer book provides a basis for their responses and guides the placement of their answers. It also suggests the expected length of responses so that lengthy explanations can be avoided.
- (d) Ethical, governance and internal control issues: Internal control processes and ethical considerations are expected to be integrated across all topics at strategic points in the Annual Teaching Plan. This means that there are no specific time frames or scope of content that must be covered. These are often open-ended, real-life scenarios of problems that affect businesses, such as weak internal controls, lack of accountability, bribery, corruption, auditing irregularities and poor corporate governance. Teachers are strongly advised to encourage discussion and debate on these issues in the classroom. This should be done on a continuous basis, as and when topical issues arise. 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 the current generation.
- (e) Teachers should also refer to previous Diagnostic Reports for detailed recommendations on the basic concepts contained in the Accounting Equation, the structure of components of the different financial statements and instilling a questioning approach to the subject.

2.3 DIAGNOSTIC QUESTION ANALYSIS OF PAPER 1

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 performance per question in Paper 1

Q	Topic/s
1	Fixed Assets and Statement of Comprehensive Income
2	Financial Indicators and Cash Flow Statement
3	Interpretation of Financial Statements
4	Corporate Governance



Graph 2.3.2 Average performance per sub-question in Paper 1

Sub-question	Topic/s
1.1	Calculations: Fixed Asset Note
1.2	Calculate: Trading Stock Deficit
1.3	Statement of Comprehensive Income
2.1	Financial Statements: Concepts
2.2	Cash Flow Statement and Financial Indicators
3.1	Concepts: Matching
3.2	Interpretation of Financial Information
4.1	Explanation: Qualified Audit Report
4.2	Explanation: Need for Non-executive and Executive Directors
4.3	Explanation and Reason for Remuneration Committee
4.4	Explanation: Company Policy for Gifts and Donations

Candidates' performance in Paper 1 was generally most pleasing. The question paper was not regarded as predictable as innovations appeared particularly in parts of Q1 and Q4. Well-prepared candidates coped admirably across all questions and weaker candidates were able to take advantage of the marks on offer in the lower- and middle-order ranges.

As mentioned in previous reports, the change in contexts of certain sub-questions 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 were the stock valuation required to calculate stock deficit (Q1.2; 4 marks), the dividend pay-out rate (Q2.2.3; 4 marks), the comment on dividends earned (Q3.2.2; 3 marks) and the specific sub-questions on corporate governance (Q4.2; 4 marks and Q4.3; 3 marks).

2.4 ANALYSIS OF LEARNER PERFORMANCE IN EACH QUESTION IN PAPER 1

QUESTION 1: FIXED ASSETS AND STATEMENT OF COMPREHENSIVE INCOME

Candidates generally performed well in the main part of the question which was preparing the Statement of Comprehensive Income (Q1.3; 43 marks). Most candidates were able to take advantage of the easily obtainable marks by showing pre-adjustment figures in their workings and completing all subtotals appropriately. Candidates also generally earned method marks for processing adjustments correctly, however, many of them proved to be weak in calculating the specific amounts of certain adjustments.

Common errors and misconceptions

- (a) Q1.1 required candidates to identify or calculate figures relating to the Fixed Assets and their disposal. This was a standard question based on Grade 11 content. It was therefore disappointing that weaker candidates could not take full advantage of the marks on offer in this sub-question. Most candidates did not realise that the old vehicle was fully depreciated and subsequently did not apply the R1 carrying value rule.
- (b) The calculation of trading stock deficit (Q1.2; 4 marks) involved an application of the weighted average stock method. This is an example of a topic that relates to both Paper 1 (i.e. the reporting function) and Paper 2 (i.e. the valuation and control functions). Candidates' performance on this aspect was variable in what should have been a simple calculation of the stock value.
- (c) In dealing with adjustment (b), weaker candidates were unable to use the mark-up and trade discounts appropriately to calculate the sales and gross profit at the top of this financial statement (5 marks). However, they would have earned method marks in carrying their errors through to the subsequent part of the statement. This section could have been completed by starting from the sales figure or the gross profit figure.
- (d) Shortcomings of certain candidates in other calculations were also evident in the case of calculations which do not fit a simple arithmetical norm. For example, in adjustment (f) some candidates did not appreciate that if 30% of audit fees are outstanding, they would be required to multiply the amount paid by ${}^{30}/_{70}$ to calculate the additional amount due, or by ${}^{100}/_{70}$ to calculate the full amount for the year. Similar reasoning would have been required in calculating income tax for the year by using a factor of ${}^{32}/_{68}$.
- (e) Weaker candidates also struggled with mathematical literacy-type calculations requiring interpretations of scenarios such as directors' fees and advertising, as noticed in adjustments (h) and (i).
- (f) One straight-forward adjustment that created problems for candidates related to the cost of repairs to be offset against rent income. Some did not appreciate that this would lead to an increase in both rent income and repairs.

Suggestions for improvement

- (a) As mentioned in previous reports, teachers should remind learners of the skills learnt in Mathematics or Mathematical Literacy, particularly skills in using fractions, ratios and/or percentages.
- (b) Teachers should consider devoting parts of lessons to a collaborative exercise by requiring learners to focus exclusively on interpreting and discussing the adjustment scenarios and calculating appropriate figures without doing the adjusting entries.

Processing of the entries could be done subsequently as a separate activity. Understanding of the logic of the scenarios of the more complex adjustments should improve general performance in preparing financial statements.

- (c) Comprehension and interpretation play a vital role in understanding adjustments. It is important that this be addressed in the language of assessment.
- (d) Techniques to complete the Income Statement may be more challenging at Grade 12 level, such as working from the bottom and using financial indicators to calculate missing amounts. Teachers must use many examples from past NSC papers to expose learners to this type of questioning.

QUESTION 2: FINANCIAL INDICATORS AND CASH FLOW STATEMENT

The two-paper format now offers opportunities for these topics involving calculations to be placed in a question which is separate from the evaluative aspects which were placed in Q3 in this paper. This structure, together with the provision of a formula sheet, appeared to make the calculation aspects more manageable for weaker candidates.

Candidates also 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 figures in the CFS (Q2.2.1; 8 marks), sections required in the CFS (Q2.2.2; 15 marks) and the calculation of financial indicators (Q2.2.3; 10 marks). Cognitive levels and challenge have been reduced through the provision of a formula sheet for calculating financial indicators (Q2.2.3; 10 marks). Presumably this tends to suit weaker candidates and those who prefer to study this topic in rote fashion. This is evident through the general improvement in candidates' performance in this type of question.

Common errors and misconceptions

- (a) The short 'confidence-boosting' section on basic concepts (Q2.1; 3 marks) should provide opportunities for every candidate in Grade 12 to earn the full 3 marks. However, this was not always the case. This indicates a lack of emphasis, in several centres, on the concepts which are vital for better understanding of companies.
- (b) In calculating the proceeds from shares issued, the most challenging parts involved identifying the price to be used for the new shares issued and the shares repurchased. Weaker candidates did not appear to realise that the average share price is vital to calculating these amounts. Many candidates simply used the repurchase price of R9,80 instead of the average price of R7,00.
- (c) It is surprising that many candidates still cannot master the construction of the section of the CFS for net change in cash and cash equivalents, given the number of times this has appeared in past NSC papers. The bank overdraft continues to confuse some candidates, for no apparent reason.
- (d) An aspect of the calculation of the % return (Q2.2.3; 4 marks) which provided moderate challenge to weaker candidates was the use of average equity. Some candidates neglected to do this.
- (e) In the calculation of the dividend pay-out rate (Q2.2.3; 4 marks), only the stronger candidates were able to correctly identify the numerator of dividends per share (DPS) of 50 cents. This was intended as a higher-order analysis question. Many candidates used an incorrect and inappropriate method by dividing total dividends for the year of R835 000 by the number of shares at the beginning or end of the year.

Suggestions for improvement

- (a) There were no challenging aspects in the calculation of amounts for the CFS (Q2.2.1), and candidates could use T-accounts to arrive at the correct answers. Teachers are advised to use a sub-question such as this to explore how to deal with more challenging questions in future. For example, the total dividends for the year were given. Learners should be able to explain how to handle this question if the total dividends figure is not given, i.e. to multiply the interim dividends per share by the appropriate number of shares, and add this to the final dividends.
- (b) Learners should be advised that, in identifying figures relating to share capital, the reconstruction of the Share Capital Note or the Ledger Account would enable them to arrive at the correct figures. Learners should understand that for new shares issued, the actual issue price of those specific shares would be appropriate. They should also know that when shares are repurchased it would not be appropriate to use the repurchase price in the Share Capital Note because this will generally not be an accurate reflection of the price of these shares when they were originally issued. In explaining this, teachers could relate this to the example of the disposal of a fixed asset, where the selling price is not a true reflection of the original purchase price. They would, however, need to use the repurchase price when reflecting the total outflow of cash for the CFS.
- (c) Although questions on CFS in NSC papers generally focus on specific aspects only, teachers are reminded to periodically revise this financial statement by using textbook questions requiring the full CFS. This should enable learners to understand the way in which the CFS serves as an important link between the Statement of Comprehensive Income and the Statement of Financial Position.
- (d) An expected consequence of providing a formula sheet is that it tends to compromise understanding of the logic of the formulae. This, in turn, compromises the ability of learners to offer appropriate and in-depth comments or explanations of the indicators, and their ability to identify potential financial or operational problems in an organisation.
- (e) Teachers are advised to use the scenario in Q2.2.3 of dividend pay-out rate to enhance understanding of this financial indicator. In this case, new shares were issued during the year. It would have been appropriate to first calculate the final DPS.

Final DPS would be R340 000 \div 1 700 000 shares = 20 cents. The total DPS would therefore be interim DPS + final DPS, i.e. 30 cents (given) + 20 cents = 50 cents. The earnings per share was given as 74 cents, which makes the pay-out rate 50 cents \div 74 cents = 67,6%. Learners who understand the logic of this financial indicator would appreciate that the purpose is to identify the portion of earnings that is distributed to shareholders. They could have used an alternative yet appropriately valid calculation of Total Dividends of R835 000 (given) \div Total Earnings of R1 243 900 (given) = 67,1%. The difference of 0,5 percentage points is caused by the using aggregate figures, which would not take into account any change to share capital during the year.

QUESTION 3: INTERPRETATION OF FINANCIAL STATEMENTS

Q3.1 covered basic concepts affecting financial indicators (Q3.1; 4 marks). Q3.2 covered evaluation of financial indicators relating to liquidity (Q3.2.1; 6 marks), dividends (Q3.2.2; 9 marks); risk and gearing (Q3.2.3; 6 marks) and issue of shares to the CEO (Q3.2.4; 6 marks). Q3.2.5 covered the concern over the change in cash and cash equivalents as reflected in the Cash Flow Statement.

In line with previous Diagnostic Reports, it is evident that comments and explanations on these issues are very well handled by above-average candidates. Average candidates are able to earn part-marks on aspects of each sub-question with valid but incomplete responses, while below-average candidates continue to struggle to correctly interpret the question, identify and quote relevant information, and to express their responses clearly.

Common errors and misconceptions

- (a) Many candidates were unable to correctly match questions on financial information which related to the correct category of financial indicators. As mentioned above for Q2, lack of understanding of the logic of financial indicators is a problem experienced by weaker candidates.
- (b) Candidates generally performed well in Q3.2.1 (6 marks) with relevant comments on liquidity. This is a topic which has been covered since Grade 8. Weaker candidates failed to identify that stock and collection policies were negative issues. However, some of them were able to identify trends in two obviously relevant indicators, particularly the current and acid-test ratios, which were given in the question.
- (c) While most candidates were able to explain the trend in DPS and the change in the pay-out rate (Q3.2.2; 6 marks), the third part Q3.2.2 (3 marks) was a more challenging higher-order question which related to evaluation of dividends received by a shareholder. In this case the dividends declined by 18 cents, yet the shareholder was satisfied under the context where both the earnings per share (EPS) and market price of the shares also declined. Many candidates were able to earn part marks by quoting relevant figures and their trends. Only the more competent candidates were able to explain the consequential effect of the decline in earnings on the decline in dividends. It was particularly encouraging that the most capable candidates were proficient in comparing DPS for each year to the applicable market price of the share for each year to assess the extent of the direct return earned by the shareholder through dividends.
- (d) Regarding risk and gearing (Q3.3.3; 6 marks), most candidates were able to quote both the return on capital employed and the debt-equity ratios as relevant indicators. Some candidates were unable to translate this into meaningful comments as required by the question.
- (e) Q3.2.4 (6 marks) related to concern over the shares issued to the CEO. Many candidates identified that the price of the share was considerably lower than the market price of the shares, but could not translate this information into two separate reasons for concern as required by the question. Only the more capable candidates were able to clearly explain the ethical concern over the unfair benefit to the CEO, and the effect on the company which is losing out on the full potential funding it could be receiving.

(f) In assessing totals from the CFS (Q3.2.5; 4 marks), while most candidates did well in this question by providing two valid points with figures, weaker candidates appeared to lack the skill of interpreting the financial summary contained in the extract from the CFS.

Suggestions for improvement

- (a) Teachers are advised to conduct short informal tasks in class on the basic concepts, such as that contained in Q3.1 which can be peer- or self-marked. However, this would be pointless if the task is not accompanied by discussion on the logic or underlying reasoning of the questions.
- (b) Teachers should aim to recognise opportunities to extend their learners through collaborative discussions on aspects of questions which could be further explored to 'flesh out' the topic. An example is the third part of Q3.2.2 in which capable candidates did assess dividends in relation to other factors such as market price. Some even referred to this as 'dividend yield', a concept not specified in the curriculum. Responses such as this from certain centres are encouraging as they tend to indicate that teachers are aiming to extend their top learners by enriching the curriculum.
- (c) Integration of ethical and corporate governance issues are required throughout the Accounting curriculum where applicable. Small-group discussions on such scenarios will benefit learners, provided these are supplemented by additional ideas offered by others in a general class discussion. The scenario contained in Q3.2.4 regarding shares issued to the CEO is a case in point. Factors that could have been further explored are that the CEO used her position to influence the price, the possibility of criminal charges for insider-trading and the negativity that would reflect on the company which could affect the market price of the share in future and prejudice other shareholders.
- (d) Correctly interpreting questions and the information contained therein is a skill that learners obviously need to acquire to achieve their potential in any subject. It is often claimed that an individual does not truly internalise a concept or topic until he or she has an opportunity to verbalise and express views on the item. Despite the time pressures in completing a curriculum, teachers should find that skilfully facilitating short discussions in class regularly will greatly benefit learners. This is particularly relevant to the topic of interpretation of financial information.
- (e) It is also necessary for teachers to be more creative in developing material for independent studies, taking into account present circumstances of disruptions and rotational school programmes.

QUESTION 4: CORPORATE GOVERNANCE

This question was designed as a 15-mark item which comprised four parts on scenarios relating to corporate governance. This is a topic which will be pertinent to the future careers and personal growth of high school learners and which, in terms of the *CAPS*, requires integration into the teaching of all topics related to companies.

The two-paper format has provided an opportunity for a separate question in Paper 1 on this topic which has, in the past, been integrated in other questions, as middle- to higher-order scenarios. This approach was clearly a departure from that of past papers. However, it is regarded as a valid innovation in line with the degree of innovation reflected in previous NSC Accounting papers.

The four parts to this question contained open-ended questions with multiple valid responses possible. These responses did not specifically require reference to company legislation or the King Code. Candidates from many centres managed admirably with this question indicating that the topic had been effectively integrated by teachers in those centres. However, subquestions Q4.2 and Q4.3 were poorly answered by many candidates in other centres.

Common errors and misconceptions

- (a) The topic of a qualified audit report has been covered regularly in past NSC Accounting papers where questions provided extracts from audit reports and required candidates to explain the type and nature of the report. In Q4.1 (4 marks) candidates were simply required to explain two points on why a qualified audit report is not a good reflection on a company. It was therefore disappointing that some candidates were not able to offer any valid explanation, while others could offer only one explanation.
- (b) Q4.2 (4 marks) required candidates to explain why it is important for a company to include executive and non-executive directors on the board, and the difference between the two types of directors was briefly explained in the question. Essentially this sub-question focused on the need for boards to make good decisions as a result of more diverse opinions; however, a wide variety of simple explanations on this topic were recognised. Although candidates from a large number of centres offered valid or wise reasons, it was disappointing that candidates from other centres earned no marks or not more than two part-marks for their explanations. Some candidates simply copied the explanations provided in the question.
- (c) Q4.3 (3 marks) required candidates to explain why a Remunerations Committee is required by a company. This should not have been a foreign concept to teachers and candidates as reference to this committee was contained in the 2017 NSC Accounting paper in the context of audit reports. Ignorance by candidates from many centres of the need for such a committee and the ethical issues relating to salaries and wages seems to indicate that no reference has been made to this major issue in the assignment or project on published annual financial reports required by the CAPS.
- (d) Q4.4 (4 marks) required candidates to explain why directors should declare gifts and other benefits received from clients to the Board of Directors. The topic of bribes has been covered regularly in past NSC Accounting papers, the most recent being in the 2019 NSC paper in the context of stock control in a private company. It was therefore disappointing that many candidates were unable to explain two valid points as required by the question.

Suggestions for improvement

- (a) The suggestions to teachers on classroom discussions in the context of financial interpretation in Q3 (above) apply equally to corporate governance and ethics in Q4.
- (b) Teachers are reminded that the *CAPS*, *Examination Guidelines* and the Annual Teaching Plan require that the topics of Ethics, Corporate Governance and Internal Control be integrated in all relevant topics on companies. This must not be neglected.
- (c) These topics do not always require prescriptive responses and may be open-ended in nature and offer opportunities to learners to exercise their skills in innovation and creativity. They are best taught through the medium of short scenarios or case studies. As the information may be topical and recent, teachers are advised to keep in touch with modern trends and newsworthy items as opportunities to provide relevant material

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that can be used in class discussions or in short formative class activities. A reliance on textbooks and prepared notes will not be adequate to address these issues.

- (d) The values adopted by the school could also be used by teachers as a useful reference point. In short, these topics are all based on logic, common sense and the prevention of crime or financial abuse.
- (e) Questions may focus on practical problem-solving recommendations and are generally open-ended with a variety of acceptable valid responses based on the principles of accountability, responsible management and application of good values in preventing corruption, conflict of interests or abuse.
- (f) The Term 1 assignment stipulates an assignment/project on Annual Reports of companies which should have exposed learners to most of the factors in Q4.
- (g) Corporate governance issues are often highlighted in the published financial statements (annual reports) that would form the basis of the assignment/project covered in the first or second term of Grade 12. This SBA task should focus not only on the analysis of the audited figures but should be designed to expose learners to other general aspects of a public company.
- (h) Teachers should mention the work and mission of the Board of Directors, the directors' reports and the work of the company's various committees to ensure good governance e.g. the audit committee, remunerations committee, the ethics committee or any other committee that would add value to the company, its stakeholders and the wider community, including climate control and environmental issues.
- (i) The issue of undeserved and excessive directors' fees is a major concern across the world. It should therefore be a priority for teachers to highlight this issue when opportunities arise in the teaching and assessment process, particularly in the assignment or project mentioned above. Learners will be intrigued by how many directors are appointed and how much they are rewarded for their roles, and whether their fees have been reduced in years of declining profits. Such points should be highlighted in the development of the assignment/project.

2.5 DIAGNOSTIC QUESTION ANALYSIS OF PAPER 2

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



Graph 2.5.1 Average performance per question in Paper 2

Q	Topic/s
1	VAT and Creditors' Reconciliation
2	Cost Accounting (Manufacturing)
3	Budgeting
4	Stock valuation



Graph 2.5.2 Average performance per sub-question in Paper 2

Sub-question	Topic/s
1.1	VAT calculations and ethics
1.2	Creditors' Reconciliation and ethics
2.1	Production Cost Statement and gross profit calculations
2.2	Unit costs and break-even analysis
3.1	Debtors' Collection Schedule
3.2	Calculations for the cash budget
3.3a	Decision: budget vs actual
3.3b	Reporting on the effect of decisions on sales and customers
3.3b1	Explanation: customers and average spending
3.3b2	Control of consumable stores
3.4	Calculation: reduction in floor space rented
4.1	Stock Valuation: concepts
4.2	Stock Valuation: FIFO and specification

The topics tested in Paper 2 are distinct and fairly predictable. Well-prepared candidates coped well across all questions and weaker candidates were also able to take advantage of the lower- and middle-order sub-questions. This is testament to the extent of the revision programmes and focused initiatives at various levels to address weaknesses and challenges. Past NSC papers remain relevant and extremely useful because the transformation did not involve any changes to content and LTSM that was already in use.

Underachievement in certain areas continues to be noticed, particularly Creditors' Reconciliation (Q1.2.1), interpretation of budget information (Q3.3) and interpretation involving stock methods (Q4.2.3 and Q4.2.5). Learners still show weaknesses in reading and understanding, and often provide inappropriate comments to interpretative questions.

A change in style and structure of certain sub-questions appeared to increase the challenge. Candidates clearly prefer predictable questions that are identical to those in previous papers. This is an indication of the way they are trained or groomed for the final examination which is not conducive to good and effective education.

2.6 ANALYSIS OF LEARNER PERFORMANCE IN EACH QUESTION IN PAPER 2

QUESTION 1: VAT AND CREDITORS RECONCILIATION

Q1.1 tested VAT calculations and an ethical scenario. The majority of candidates were able to perform the calculations with ease. Some candidates experienced difficulty with the calculation of item (d) as this included a portion of zero-rated sales, which had to be corrected.

The Creditors' Reconciliation (Q1.2.1; 9 marks) was well answered. The format and style was similar to questions in previous papers. Candidates also easily identified the ethical issue regarding Invoice 395, and offered the stereotypical responses found in many past exam papers.

Common errors and misconceptions

- (a) It was disappointing to note that some candidates still have issues with understanding 'inclusive' and 'exclusive' regarding VAT calculations. It is possible that many expected a calculation related to the amount receivable or payable to SARS, and were surprised by the change in questioning style.
- (b) In Q1.2.1 a small percentage of candidates were not able to place the relevant figures in the correct column and lost marks for superfluous entries. This exposed their lack of understanding of the logic, purpose and procedure of reconciliations and their inability to interpret the errors and omissions identified. Weaker candidates often repeated figures in incorrect columns, or used the incorrect signs (+ or –).
- (c) The differences identified between the Creditors' Ledger Account and the Statement from the creditor were the commonly tested ones. Weaker candidates struggled with item (b), an amount incorrectly recorded by one party, item (d), a transfer from the Debtors' Ledger to the Creditors' Ledger account and item (e), an entry posted on the wrong side of an account.
- (d) With regard to the ethical issue in Q1.2.2, candidates were familiar with the usual scenario of theft and mismanagement. They were therefore confused with the question stating that the owner 'does not regard this as theft' which was intended to eliminate the stock response of 'fire him'. Many candidates were not able to think of other creative responses to answer this question. The marking guideline, however, did make provision for part-marks for unclear or partial responses.

Suggestions for improvement

- (a) VAT calculations may appear to be elementary and time consuming. Teachers must, however, provide many updated activities (15% standard rate) to ensure a sound prior knowledge. Once this skill is mastered, then more complex examples can be introduced. Short focused class tests are effective in this regard.
- (b) Teachers must appreciate that reconciliations are relevant monthly internal control processes that follow logical procedures to achieve specific outcomes. Equal attention must be devoted to cash (bank), debtors and creditors. This topic is introduced in

Grade 10 and basic application is covered in Grade 11. The Grade 12 syllabus will rely on this prior knowledge and extend into more analysis and interpretation. It must therefore not be assumed to be easy. Learners will require a variety of relevant revision material and regular practice. Teachers must also 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.

- (c) Class discussions must consistently refer to the internal control benefits of the reconciliation process. To this end, the external documents (statements from banks or creditors) must be emphasised, especially when differences must be identified and appropriate action must be taken to address errors and omissions. An added benefit of regular reconciliations is that possible mismanagement, incompetence and fraud are detected at an early stage, so that corrective and/or preventative measures can be implemented.
- (d) Formal and informal assessment programmes must include short, formative tests in class that can be self- or peer-marked. It has now become necessary for learners to take responsibility for their shortcomings and appreciate how marks can be earned (or lost) in test and examination situations.
- (e) Developments in the Fourth Industrial Revolution and changes in the banking environment has placed added pressure on teachers to keep up with current trends in all matters affecting the Accounting content. Teachers are therefore encouraged to explore current resources for relevant material and place less reliance on textbooks, which may provide standard procedures and activities, but fall short on current trends. Teachers should also reflect on their own real-life personal experiences in dealing with suppliers and banks to enhance the teaching and learning process, e.g regarding service delivery, electronic funds transfers and mortgages. It is not the intention to examine or teach procedures which no longer exist in practice. The abolishing of cheques is a prime example.
- (f) Subject advisors can make effective use of cluster groups to design and formulate content manuals and share a common understanding. This will foster a sense of teamwork and confidence in delivering the appropriate content.

QUESTION 2: COST ACCOUNTING (MANUFACTURING)

Sub-questions on this topic comprise content that is predictable and manageable and is found to be relatively easy, as reflected on Graph 2.5.1. Candidates took advantage of the 'easy' marks by showing relevant workings on the Production Cost Statement (2.1.1; 14 marks) and in effectively using their answers for calculations in Q2.1.2 (7 marks). With reference to breakeven point and unit cost analysis (Q2.2.2; 4 marks), candidates could easily do the relevant calculations, but again struggled with analysis and interpretation of unit costs.

Candidates offered the stereotypical responses for increase in direct labour cost and decrease in direct material cost per unit. Some confused the 'increase' and 'decrease' and provided valid responses for the opposite effect, hence not answering the question.

It was a concern that many candidates were not able to calculate the additional units that the business needed to produce to achieve an additional profit of R250 000 (Q2.2.8; 4 marks). This problem was identified as a challenge in the 2019 November examination paper and a detailed explanation (with a practical example) was provided in the Examination Guidelines.

Common errors and misconceptions

- (a) In completing the Production Cost Statement (Q2.1.1; 14 marks), weaker candidates did not manage the adjustments for the factory overhead costs, possibly due to poor interpretation of the errors identified. Many also failed to calculate the cost of production of finished goods by simply multiplying the number of units produced by the unit cost of production; both amounts were given.
- (b) It was necessary to calculate the cost of sales to answer Q2.1.2 (5 marks). Many candidates did not realise that they had to reconstruct the finished goods stock account to get this figure and only used the total cost of production (from Q2.1.1). They received part marks. This concept and calculation was highlighted in the 2019 Diagnostic Report.
- (c) Calculating and commenting on the break-even point (Q2.2.1; 4 marks and Q2.2.2; 4 marks) were generally well done. Candidates were required to comment on both the break-even point and the level of production; however, many candidates made a comparison of only one of these factors. A valid comment should firstly comment on the difference between the break-even point and the number of units produced, as this determines the profit or loss. Comparisons between the BEP only or the level of production only would serve a supporting role but does not fully answer the question.
- (d) In Q2.2.3 (4 marks), and Q2.2.4 (4 marks) most candidates were able to provide valid reasons for the increase in direct labour cost and the decrease in direct material cost. Many of the weaker candidates were unable to provide two distinctly separate reasons; they also confused the reasons for an increase/decrease and for labour/material. Markers had to be vigilant as some reasons could apply to both variable costs.
- (e) Q2.2.7 (4 marks) proved to be challenging to candidates as they needed to focus on the *impact* of the increase in selling price. They were confused about what figures to quote. *This was further compounded by the BEP figures and the number of units produced being swapped on the table of information provided, which may have been noticed by the more discerning candidates.
- (f) Calculating the additional units (Q2.2.8; 4 marks) is regarded as a higher-order subquestion that is aligned to break-even analysis. It was anticipated that candidates would simply use the contribution per unit (selling price per unit – variable cost per unit) to arrive at this answer, but many used a variety of complex and time-consuming procedures, including an extension of the break-even formula. This could have impacted on time management. There was no need for candidates to consider past profits or losses as the question focused only on the additional R250 000.

Suggestions for improvement

- (a) Due to the predictable nature of this topic, examiners will always attempt to introduce more creative and innovative scenarios in order to achieve a balance between lowerand higher-order sub-questions. Teachers are, therefore, advised to provide a variety of examples to learners and expose them to the different questioning techniques. This would have to extend beyond the reliance on only past exam papers.
- (b) Inappropriate calculations observed in the Production Cost Statement, especially the factory overhead costs, revealed that emphasis must also be placed on improving the calculation skills, particularly for weaker learners. This must include using fractions, ratios and/or percentages to calculate costs for the different components or departments in a manufacturing environment. Year-end adjustments and reversals

and correction of errors may also feature in these calculations. Formative tests on specific aspects of the topic can be effectively used to revise and assess prior knowledge covered in Grades 10 and 11. This will form the basis of dealing with the more complex calculations in Grade 12.

- (c) Teachers are encouraged to reinforce learners' understanding of the various items used in the Production Cost Statement at every available opportunity. This must include the different cost categories, different stock accounts as well as unit cost analysis. In this way, learners would not view each aspect as separate and independent but appreciate the holistic approach of this topic.
- (d) Weaker learners may require more visual stimuli to clearly understand the main components of a manufacturing entity. Video presentations and demonstrations could be useful in this regard. Teachers can explore educational websites for these resources. They must encourage learners to do the same. This should enable them to make more well-informed interpretations of the different cost components, unit costs and break-even analysis.
- (e) 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 must be incorporated into teaching plans. Formal assessment tasks such as case study or assignment can be used to achieve this objective. Class discussions must follow. Learners must be encouraged to participate and to share ideas.
- (f) Teachers are expected to interrogate previous Diagnostic Reports so that they can focus on the weaknesses identified by provincial moderators, so that they can adjust their approach to addressing such issues. It is disappointing that the detailed explanation on contribution per unit and additional units provided in the *Examination Guidelines*, was not effectively used, as evident by the poor responses to the subquestion on this topic. A series of short yet effective calculations to determine the additional units required for a projected increase in profit, or the converse calculation to determine the additional profit that will be earned by an increase in units produced, must be developed and used.
- (g) Learners must be exposed to the problem-solving potential of this topic. This should involve information on different products or different financial periods. The object is to calculate percentage increases or decreases, identify problems and offer practical solutions or advice. This has been a trend in many past examination papers. Teachers must use these as a basis to develop additional examples.

QUESTION 3: BUDGETING

It is still a concern that a fair percentage of candidates struggle with this topic. Performance in basic calculations has improved, but interpretation continues to be a challenge.

The Debtors' Collection Schedule (Q3.1; 9 marks) and Cash Budget calculations (Q3.2; 14 marks) were generally well answered. These sub-questions have been covered in many past NSC papers and essentially comprise Grade 11 content.

Q3.3 (4 marks) focused on the interpretation of specific items on the cash budget. Candidates had to interact with the actual and budgeted figures and quote relevant figures to support their explanations. The mediocre responses of candidates are an indication that this aspect of the topic is not adequately addressed. There might also be an over-reliance on past examination questions while language and interpretation skills continue to be a stumbling block.

Common errors and misconceptions

- (a) With reference to Q3.1 (9 marks) and Q3.2 (14 marks) certain commonly used calculations continue to be poorly handled. This includes the application of a % discount offered to debtors who pay in the month of sales, when completing the Debtors' Collection Schedule and using the correct formula to determine an increase or decrease in the loan.
- (b) The calculation of Salaries for April required a careful interpretation of the scenario presented. A fair percentage of candidates only provided part of the calculation and were able to score part-marks.
- (c) The below-average candidates continued to show weaknesses with calculations involving percentages; either increases or decreases or working backwards for amounts before the increase / decrease. Some of these are basic Grade 9 calculations.
- (d) Part 1 of Q3.3 (4 marks) required explanations on the increase in the budgeted amount for advertising as well as the actual expenditure which exceeded that budget. The question required explanations of both the actual and the budgeted figures. Many candidates earned part-marks for focusing only on the actual figures by comparing them to the budget without commenting further on the increase in the budget.
- (e) Most candidates earned part-marks in the third part of Q3.3 (3 marks) because they repeated the figures quoted in a previous part instead of using the average amounts, as requested by the question. They failed to see the link between the number of customers as opposed to their average spending; a clear reflection of the economy in present times.
- (f) A large percentage of candidates failed to see the relationship between items on a Cash Budget, such as consumable stores and fee income, as expected in the fourth part of Q3.3 (2 marks) They only compared the actual expenditure against the budgeted amount and concluded that consumable stores were not well controlled. Only the more capable candidates were able to identify that the increase in fee income was the reason for additional consumable items being used.
- (g) Some may have felt that Q3.4 (4 marks) was a mathematical literacy question. This was pitched as a higher-order question and it was pleasing to note that many candidates were able to score some marks. This question could have gone on to require candidates to examine the budgeted amount against the actual reduction in rent expense and relate this to the surface area being rented.

Suggestions for improvement

- (a) The Grade 11 *CAPS* refers to preparation and presentation of the Cash Budget and the Projected Income Statement, while the Grade 12 *CAPS* emphasises analysis and interpretation of that information. It is therefore essential that the Grade 11 content be revised and consolidated before moving into more challenging analysis and interpretation of the budget information. Learners must be able to identify and calculate relevant figures for either the Cash Budget or the Projected Income Statement. They must also have a clear understanding of cash and non-cash items, and the difference between receipts and income and payments and expenses.
- (b) In addition, it is also vital that learners are able to distinguish between the Cash Budget and the Projected Income Statement, in terms of similarities and differences and in terms of actual and budgeted figures. Short formative and summative activities and

focused class tests can be quickly used to assess prior knowledge before moving on to Grade 12 content. Weaker learners must be identified and additional material must be prepared to assist them.

- (c) Constant revision and reinforcement of learners' skills in working with percentages, ratios and equations are also applicable in this topic. Regular short tests that may be repetitive in nature can be very effective in improving mathematical skills.
- (d) Regarding interpretation of budget information, it is recommended that specific scenarios be extracted from the many past NSC papers and be used for class discussions or as part of the formal assessment programme. Scenarios such as Q3.3 and Q3.4 should be used and interrogated, firstly by teachers in cluster groups and then shared with learners. Such an exercise must emphasise the logic, the variety of possible responses and language issues. Teachers are expected to integrate subject-specific language and relevant verbs as part of their Language Across the Curriculum initiatives.
- (e) In addressing the analysis of actual figures against budgeted figures, teachers must pay careful attention to the appropriate use of terms such as *overspent, underspent, under-budgeted* and *over-budgeted*. Teachers and learners must move away from the simplistic notion of looking at budget items in isolation to gauge whether it was well controlled or not. They should also assess the *impact* of the item on related items of income or expenses and on business operations in general.
- (f) It is imperative that healthy class discussions follow all activities of interpretation and learners must be allowed and encouraged to express their concerns openly. Hopefully such an exercise will lead them to offer more meaningful and creative responses rather than the repetitive options found in marking guidelines of past papers.

QUESTION 4: STOCK VALUATION

The First-In-First-Out (FIFO) and the specific identification stock valuation methods were tested. A balance of basic calculations, interpretation and ethical considerations were included for each method. The majority of candidates took advantage of the easily obtainable marks for routine calculations and comments, which have appeared regularly in past NSC papers. Some challenging interpretative sub-questions were included to achieve a balance between cognitive levels.

In addition to the basic calculations, the question integrated business ethics and mismanagement in a problem-solving context. Such issues are receiving much public interest and learners are exposed to this through newsfeeds and social media. Teachers seem to be hard-pressed to keep in touch with current issues so that they can respond appropriately to such concerns raised by learners.

Common errors and misconceptions

- (a) Calculating the closing stock value using FIFO (Q4.2.1; 6 marks) requires candidates to focus on the latest purchases. This was generally well understood, except for the fact that some candidates did not take into account the returns from the appropriate batch. They managed to score part marks for using the correct method.
- (b) In the second part of Q4.2.1 (6 marks), candidates were required to calculate the cost of sales, which was used to calculate the stock-holding period. Some candidates used unnecessarily lengthy processes to calculate this amount, while some also chose to work downwards from the opening stock. The information in this question made it

possible for candidates to use the number of units. Candidates who used this method would have clearly understood the logic of the stock-holding period calculation. This valid alternative was a much shorter and more efficient method.

- (c) The question specifically requested that the closing stock figure be used. Many candidates used the average stock, which requires an unnecessary calculation. This calculation can also be done using units instead of monetary amounts. Some candidates combined monetary values with units. They were awarded the relevant part-marks for figures in the workings that were correct.
- (d) Although the calculation of the missing lamps in Q4.2.2 (4 marks) was generally well done, the scenario of stock shortage in Q4.2.3 (4 marks) produced variable responses. Provision of two different points relating to ethics and internal control was expected from candidates. However, many simply re-stated the same points in different ways and received only part-marks.
- (e) The valuation of closing stock for gas stoves (Q4.2.4; 5 marks), using specific identification was poorly answered. Many candidates confused the two models and the relevant cost prices of each. Many different method of calculations were noted, even an integration of the FIFO method. Nevertheless, candidates were able to score at least 2 of the 5 marks for quoting the number of units still in stock.
- (f) The problem-solving question (Q4.2.5; 6 marks) was generally well answered due to its open-ended nature. Many of the candidates scored only part-marks as they were not able to quote relevant figures to motivate why Alex should stop selling gas stoves. Many candidates also mentioned the same points in different ways.

Suggestions for improvement

- (a) Teachers are advised to consult the many past NSC papers and adopt a standard format for the calculation of the closing stock value under each stock valuation method. This will give learners more confidence in answering this question and it will also obviate conjecture on the lengthy processes that some centres seem to follow unnecessarily. Learners should be guided in adopting more efficient methods. A similar approach should also be used for the cost of sales calculation.
- (b) Stock systems covered in Grade 11 must be clearly understood and revised, when addressing prior knowledge. Learners must be able to identify differences as well as advantages and disadvantages. Teachers must emphasise the fact that if missing items is determined only by doing a physical stock count, the business is obviously using a periodic inventory system. The supporting detailed stock records under a perpetual system could also reveal the information required.
- (c) A clear distinction of the three stock valuation methods can best be explained by making reference to specific types of products, their relative values and rate of sales. Questions extracted from past NSC papers must be used to illustrate the differences in questioning techniques of each stock method.
- (d) The predictable calculations under all stock valuation methods must be targeted as easily obtainable marks. These include figures for closing stock, cost of sales, gross profit and missing items. The relevant financial indicators can be added to this list. Aspects of stock control, missing items and the stock holding period are usually linked to further analysis of effective stock management, internal controls and also ethical consideration. Learners will be expected to comment, make comparisons and offer Suggestions for improvement.

- (e) This topic also lends itself to deep problem-solving scenarios, where a table of information is provided and learners are expected to critically analyse the information presented and quote relevant figures to justify and support the arguments they present. Examples of such questions appear in past NSC papers. They must be used in class tests, assignments or case studies so that learners are not surprised with this style of questioning often found in a final examination paper.
- (f) Because stock valuation is a topic that can feature in P1 and in P2, it is imperative that teachers discuss this with learners, and provide practical examples of the integration of this topic. In P1, this could be an adjustment to the preparation of financial statements, such as the calculation of cost of sales, stock loss/deficit or trading stock figure. It can also be integrated with P2 topics such as stock accounts in manufacturing or purchases and sales in budgets.
CHAPTER 3

AGRICULTURAL SCIENCES

The following report should be read in conjunction with the Agricultural Sciences question papers of the November 2020 NSC examination.

3.1 **PERFORMANCE TRENDS (2016–2020)**

The number of candidates who wrote the Agricultural Sciences examination in 2020 increased by 3 475 in comparison to the number in 2019. The performance of the candidates in 2020 reflects a decline at the 30% level from 74,6% in 2019 to 72,7%, but a slight increase at the 40% level from 45,7% in 2019 to 45,9%.

Table 3.1.1 Overall achievement rates 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
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
2020	96 155	69 916	72,7	44 114	45,9



Graph 3.1.1 Overall achievement rates in Agricultural Sciences (percentage)



Graph 3.1.2 Performance distribution curves in Agricultural Sciences (percentage)

3.2 GENERAL COMMENTS FOR PAPER 1 AND PAPER 2

There are several factors that contribute to poor subject knowledge and poor performance by candidates in the NSC Agricultural Sciences papers. The following general recommendations for improvement are applicable to both papers in 2020:

- (a) **The importance of formative testing:** Tests should assess learning to provide directions for remedial measures. Self-assessment and peer assessment with immediate feedback on errors provides learners with an opportunity to increase their understanding of the problem. They also become exposed to valid alternative responses and different, easier approaches to solving problems.
- (b) **Basic concepts & terminology:** Learners need to be exposed to the basics of each topic for them to engage effectively with the content in that topic. The process of conceptualising and understanding these concepts is more than merely rote-learning of 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 engaging learners in the identification of key concepts for each topic and then guiding them on how to formulate shorter definitions without losing the context. They can also make use of short puzzles based on these terms, thus utilising the art of learning through play.

Learners should also be encouraged to first identify the concepts from the topic and then prepare a glossary for each topic. Teachers are advised to use the following strategies to improve the teaching of basic concepts and terminology:

- Use new concepts and terms in sentences and in short scenarios to Illustrate their meaning.
- Engage learners in the identification of new terms and in finding their meanings from the textbooks.

- Learners should compile a glossary of terms in their notebooks after completion of each topic, 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 for all the topics.
- Agricultural Sciences terminology should be assessed daily using different forms of informal activities.
- Challenging or confusing terminology could be explained by using illustrations or 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 sub-questions 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*. Teachers must explain the context in which key verbs such as 'deduce', 'justify', 'explain' and 'suggest' are used and the expected depth in the answer that is expected for each. The marking guidelines of past examination papers can be used to show how the responses to similar questions can differ because of the key verb used in the question. Teachers should use various instructional verbs in both informal and formal assessment tasks. It is always encouraged that these informal tasks should mostly lean towards developing conceptual skills. 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 what is presented in the textbooks or by the teacher. Learners need to be guided on how to process data presented in different forms, be it tables, graphs, calculations or scenarios. Teachers need to sharpen their learner's analytical skills by exposing them to challenging informal and formal tasks.
- (e) **Real-life scenarios:** Learners show a serious lack in the processing of application questions and this is an indication of a lack in the depth of their subject knowledge. Learners need to be exposed to more real-life agricultural situations through visits to sites of practice. Where a practical demonstration is not possible, the use of videos that simulate the actual practice is recommended to enhance intensive learning.

Teachers are advised to include scenarios, case studies and short statements in their informal and formal assessment tasks. These tasks should test the application of learnt knowledge into real farming practises. Teachers should show the learners how to approach questions based on sources such as pictures, scenarios or case studies. This could be done by first reading and analysing the source, leading them on how to find clues and thereafter associating the key information discovered with a topic, before finally getting to the actual questions. In some instances, learners can be requested to formulate their own questions based on the source. This practise will allow learners to critically analyse the source. Teachers can then develop follow-up questions to extend learners' understanding of the content.

(f) **Enhancing the interpretation of calculated values:** Examination papers in Agricultural Sciences contain some simple mathematical processes, e.g. drawing of graphs, calculating percentages, conversion of values, expression into relevant units, use of formulae and substitution of values. Learners seem to lack appreciation of the magnitude of the various units, such as the difference between tons and kilograms.

They also seem uncertain when to divide or multiply, how to convert monthly to daily needs or vice versa or changing group needs to individual needs and vice versa.

Teachers are advised to give regular informal tasks on calculations incorporating the different versions. Teachers should not assume that learners have successfully engaged with these skills in other subjects or can successfully transfer these skills from other subjects to the study of Agricultural Sciences. They should show learners how to apply the already acquired information. Teachers are advised to first indicate to learners the importance of the various calculations to farming before showing them the actual skill of performing the calculations.

- (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 questions in 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*. Teachers are advised not to engage in whole question paper revision, it is better to consolidate questions from various papers into a bank of question for each topic and then engage with question revision.
- (h) **Reference to the CAPS, Examination Guidelines and previous Diagnostic Reports:** Teaching and assessment must be informed by the content prescribed in the *CAPS* and the approach outlined in the *Examination Guidelines*. There might be aspects of the content that have never been assessed 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 important that teachers use a variety of the prescribed textbooks to source information and then consolidate it for learners. 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 Q2 and Q3 showed an improvement from 2019.
- (b) There was a decline in performance in Q1. This may be attributed to poor performance in Q1.1 and Q1.2 because candidates showed a lack of understanding of the language used in the subject.
- (c) Candidates performed better with the calculations in Q2 but the interpretation of the calculated values still pose a challenge, even to the stronger candidates.
- (d) Candidates are now able to draw graphs but have challenges with the interpretation of graphs.
- (e) In Q3 the performance improved but It was clear that most candidates could not differentiate between a farming system and a production system. They are grappling with animal handling, how diseases are transmitted and are still confusing the role of the farmer with that of the state in the prevention and control of animal diseases. They were also unable to identify management practices that are applicable to external parasites only.

- (f) Questions requiring reasoning, motivation or justification were still poorly answered by most candidates. This indicated that candidates are not sufficiently exposed to these types of questions in the classroom.
- (g) The language of learning and teaching is proving to be a challenge to most of candidates as they are not able to respond appropriately to the instruction verbs used in questions. The spelling of terms is yet another challenge.

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 performance per question in Paper 1

Q	Topic/s
1	Short questions
2	Animal nutrition
3	Animal production, protection & control
4	Animal reproduction



Graph 3.4.2 Average performance per sub-question in Paper 1

Sub-question	Торіс
1.1	Multiple choice
1.2	Match column
1.3	Terminology
1.4	Replacement of incorrect word
2.1	Alimentary canals of farm animals
2.2	Components of feeds
2.3	Calculation of the digestibility co-efficiency
2.4	Energy value of feeds
2.5	Nutritive ratio
2.6	Feed flow plan
3.1	Temperature requirements for broiler chickens
3.2	Behaviour of farm animals during handling
3.3	Farming systems
3.4	Notifiable diseases
3.5	Internal parasites in sheep
3.6	Plant poisoning
4.1	Reproductive system of a bull
4.2	Lack of libido in bulls
4.3	Artificial Insemination and pregnancy rate in cows
4.4	Process of fertilisation
4.5	Pregnancy in cows
4.6	Problems in heifers during calving
4.7	Embryo transfer and implantation

3.5 ANALYSIS OF LEARNER PERFORMANCE IN INDIVIDUAL QUESTIONS IN PAPER 1

QUESTION 1: SHORT QUESTIONS (ANIMAL SCIENCES)

Common errors and misconceptions

- (a) Most candidates were unable to answer Q1.1.3 correctly. They selected an incorrect combination because they could not link the shorter length of the small intestines to an increased surface area for absorption.
- (b) In Q1.1.8 most candidates chose A instead of C because they did not understand that the concentration of the pesticide should be higher for it to be effective.
- (c) When answering Q1.1.10 candidates were unable to relate prostaglandin to the regression of corpus luteum. Instead, they opted for progesterone even though it was indicated that the cow is not pregnant.
- (d) In Q1.2.1 most candidates failed to identify straw and hay as both feeds that are high in crude fibre.
- (e) In Q1.2.4 many candidates chose ticks instead of mites as the answer because they did not analyse the description carefully and overlooked the key word 'microscopic'.
- (f) Most candidates responded to Q1.3.2 as oral intake, which was a direct extraction from the question, instead of dosing.
- (g) In Q1.3.4 most candidates focused on the phrase 'without fertilisation' and gave *infertility* as a response instead of *sterility* because the question indicated 'as a result of congenital defects'.
- (h) In Q1.4.1 most candidates lacked the understanding that the salivary glands are named according to their location in the mouth.
- (i) In Q1.4.5 most candidates displayed a lack of understanding of the concept 'embryo transfer'. Some candidates made a spelling error and wrote embryo *flashing* instead of *flushing*.

- (a) Subject advisors and teachers should compile a document that explains all the terms and concepts for various topics in the curriculum.
- (b) Teachers need to provide learners with a list of the terms that are relevant to the topic. Teachers may also engage and guide the learners on the identification of these terms. This list will form a 'road map' that will help learners gauge how much content they know and understand in a 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 refrain from teaching selected parts of the curriculum but should be guided by the content addressed in *CAPS*. 'Selective teaching' hinders a full understanding of topics.
- (g) Teachers should form a cohesive unit in their clusters. They can support each other by addressing challenging topics and by suggesting different approaches to teaching a topic so that it makes learning easy and enjoyable. These cluster units may, as a unit, set common assessment tasks.
- (h) 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

- (a) Some candidates classified the animals into non-ruminants and ruminants instead of naming them as chicken and cattle/sheep/goats.
- (b) In Q2.2.1 some candidates confused the components of feeds to types. As a result, they gave responses like *roughages* and *concentrates*. Some were giving *vitamins* under inorganic component and *minerals* under organic component.
- (c) Some candidates who were unable to provide the correct choice in Q2.2.1 presented a mixture of responses to Q2.2.2.
- (d) Many candidates thought that lipids, in Q2.2.3(b), were the main component needed for fattening, instead of carbohydrates.
- (e) In Q2.3.1 some candidates used abbreviations for the formula: DMI DME for 'dry matter intake dry matter excreted' and they sometimes left out the multiplication by 100. It was also observed that some failed to do the correct substitution and worked out their answer in kg instead of as a percentage.
- (f) In Q2.3.2 candidates were unable to explain the implication of the 74% digestibility.
- (g) Candidates lacked understanding of the basic importance of energy in Q2.4.2. Instead they responded by giving the functions of proteins and carbohydrates.
- (h) Language incompetence became obvious when candidates referred to young animals in Q2.5.2 as 'small', which in English is a reference to size and not age.
- (i) In Q2.5.3 candidates sometimes referred to *narrow* NR as *less* NR or just *narrow*.
- (j) Many candidates in Q2.6.2 responded with 'Fodder production' or 'Fodder planning' instead of Feed Flow plan, of which the key concept is the flow of the feed throughout the production season.

- (a) Posters indicating the classification of each animal according to its name could be a useful teaching tool. In addition, diagrams of the alimentary canals alongside the classes and names would give learners the opportunity to establish the similarities and differences between the alimentary canals of animals in the various classes.
- (b) Various textbooks and the dissection of real animals for observation of the parts, similarities and differences and their roles in nutrition, can be used in this regard.
- (c) Carefully planned practical investigations and questionnaires will assist learners in developing an in-depth understanding of the content.
- (d) Giving more exercises with different scenarios is imperative to make learners aware of how to respond to questions.
- (e) Teachers are encouraged to give regular informal assessment on calculations, providing guidance on the use of correct formulae and following the correct steps when substituting values. This will develop the learners' ability to make the correct calculation.
- (f) The implications of the calculated values should be explained to learners. This will enable learners to have a better understanding of the application of the results.

QUESTION 3: ANIMAL PRODUCTION, PROTECTION AND CONTROL

- (a) In Q3.1.2 most candidates responded by explaining how high the temperatures were in different weeks without indicating how the temperature requirement changed with increased age.
- (b) Candidates were unable to correctly indicate the equipment used in broiler houses to maintain the temperatures, in Q3.1.3. Most candidates provided responses such as lights, ventilators and sun instead of heaters, fans, air conditioners and foldable curtains.
- (c) In Q3.2.1 candidates lacked the understanding of farm animal behaviour to the extent that they included responses about dogs. Dogs are not farm animals prescribed in Grade 12 content but are domestic animals.
- (d) Most candidates confused the subsistence farming system represented in Q3.3.1B with the extensive production system which is not applicable to fowls, as these animals do not live entirely on the outside.
- (e) In Q3.3.2 candidates were unable to compare the two systems regarding the impact on the environment but instead they associated them with human interference.
- (f) Many candidates, in Q3.4.2, grappled with the meaning of *zoonotic*. As a result, they were showed the transmission of disease in one direction only instead of from animals to humans and vice versa.
- (g) Most candidates did not know the meaning of *enzootic* in Q3.4.3. As a result, they could not explain why swine fever is regarded as enzootic. Instead, they gave responses relating to the fact that it affects pigs only or it affects zoo animals only.

- (h) Many candidates confused the role of the state with that of the farmer. As a result, they gave responses such as deworming, sanitising and dosing.
- (i) In Q3.5.1 some candidates could not identify the parasites by names but instead they classified them as internal parasites.
- (j) In Q3.5.3 some candidates mentioned general management practices that were not applicable to internal parasites, such as vaccination, isolation, burning the infested animal.
- (k) In Q3.6.2 some candidates could not differentiate between prevention of contamination and measures to take once contamination occurs.

- (a) Teachers need to train learners not only on the drawing of graphs but also on their interpretation.
- (b) Learners should be encouraged to use the internet to access information about the tools, equipment and facilities used in different farming enterprises.
- (c) PowerPoint slides with pictures and videos on the facilities and tools could be prepared and used in the classroom to arouse the interest of the learners.
- (d) Excursions or visits to farms could be organised in collaboration with local extension officers from the Department of Agriculture.
- (e) Collaboration among subject teachers in preparation and teaching will be very beneficial. These sessions could build capacity in the concepts and in the teaching of diseases and parasites on production enterprises (by making use of mind maps that group diseases/parasites based on the pathogens/vectors), modes of transmission, key symptoms as well as preventative and control measures.
- (f) Teachers should ensure that the learners know the general and specific roles of the state that are applicable to proclaimed diseases.
- (g) Appropriate measures by farmers in the control and prevention of particular diseases and parasites should be clearly outlined.
- (h) Intensive revision of work using charts, scenarios and tables on diseases and parasites is necessary as the information is vast and might cause confusion.

QUESTION 4: ANIMAL REPRODUCTION

- (a) In Q4.1.1 C some candidates could not correctly identify the reproductive part of the bull, they confused seminal tube for seminal vesicles.
- (b) Many candidates, in Q4.1.2, gave a function not related to the part identified in Q4.1.1
- (c) In Q4.2.1 some candidates mistook a lack of libido for impotence, sterility, infertility and even libido and subsequently could not respond to Q4.2.2 which was a build-up question.

- (d) Many candidates lacked the analytical skills that were needed to identify the hours after the onset of oestrus when the highest percentage of pregnancy would be achieved. They gave hours in a range of between 0–24 hrs.
- (e) Most candidates struggled to provide the correct response in Q4.3.4. They were unable to link the insemination of cows to before ovulation because of a shorter lifespan of the egg cell than that of a sperm cell.
- (f) In Q4.5.1 some candidates mistook the illustration of the process of the *oestrus cycle*, they were unable to correctly identify the process even though there was a clue towards pregnancy of 280 days.
- (g) Candidates explained the normal presentation in Q4.5.3 instead of a term for that presentation which is *anterior*. Those who knew the term misspelt it as *interior*.
- (h) Most candidates did not know that dystocia is a problem of heifers during birth. Many candidates were unable to spell *dystocia* correctly. *Prolactin* and *relaxin* were common responses in Q4.6.1.
- (i) Nuclear transfer in Q4.7.1 was mistakenly provided as an answer instead of embryo transfer (ET) by many candidates.
- (j) Many candidates did not respond correctly to Q4.7.2 because of the incorrect identification in Q4.7.1. As a result, the importance of nuclear transfer was given instead of those of embryo transfer.
- (k) Most candidates were unable to explain a donor cow; they confused donation of embryo with donation of egg cell. Some candidates even wrote 'donation of nucleus'. This was a clear indication of a lack of understanding of the process of ET.

- (a) Teachers are encouraged to contact 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, synchronisation 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.
- (c) Enrichment and enhancement material should be sourced from various resources such as the slides from the ASAAE software.
- (d) Standardised formal tasks should be prepared, aiming at raising the level of questioning and preparing the learners for questions that require analysis and reasoning.
- (e) Topic terminology needs to be prepared and its learning emphasised.

3.6 OVERVIEW OF LEARNER PERFORMANCE IN PAPER 2

General comments

- (a) Generally, candidates' performance in this paper declined compared to 2019
- (b) In comparison to 2019, the 2020 candidates' responses indicate that most of them were unable to interpret diagrams and calculations.

General suggestions for improvement

The following suggestions for improvement are proposed to address the decline in the performance of candidates:

- (a) In addition to textbooks, other resources, e.g. agricultural magazines, should be used to develop a comprehensive understanding of subject terminology.
- (b) Teachers should expose learners to regular and consistent informal assessment tasks or activities that will improve their confidence in dealing with the subject content.
- (c) Setting of quality-assured common tasks on more data response questions such as graphs and case studies to enhance interpretation and application.
- (d) Expose learners to simple mathematical calculations involving percentages, ratios, polygenic inheritance, mass, height and length, as well as their respective units. Calculations, pictures, graphs and tables are an integral part of the subject. It is recommended that a calculation be started with the formula/formulae given, then the correct substitution be done, followed by the calculation and ultimately the correct answer. The final answer should also be re-checked, if time allows.
- (e) Although learners might only have access to one textbook, teachers should acquaint themselves with and use several available textbooks in their lesson preparation. Teachers and learners would thus be exposed to a wide range of possible activities.
- (f) Teachers need to broaden their knowledge and practical experience in certain areas of the curriculum so that they may be able to expose learners to practical situations. For example, Production Factors in Paper 2 required candidates to understand different farm records, management skills, types of labour legislations and interpret tables.
- (g) Responses to short questions show that many learners still lack basic conceptual knowledge and teachers should use various approaches to expose and explain terminology and concepts to learners. Teachers must ensure that learners are exposed to the language in which they will be writing the examination, as many learners struggle with reading, understanding and interpreting questions. Such learners also find it challenging to express their responses correctly.

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 performance per question in Paper 2

Q	Topic/s
1	Short questions
2	Agricultural Management & Marketing
3	Production Factors
4	Agricultural Genetics



Graph 3.7.2 Average performance per sub-question in Paper 2

Sub-question	Торіс
1.1	Multiple choice
1.2	Match column
1.3	Terminology
1.4	Replacement of incorrect word
2.1	Marketing functions
2.2	Demand of products at different prices
2.3	Free marketing system
2.4	Marketing chain
2.5	Entrepreneurship
3.1	Creation of capital
3.2	Management of a farming business
3.3	External forces affecting the farming business
3.4	Labour legislation
3.5	Land as production factor
3.6	Budget in a broiler production
4.1	Monohybrid cross
4.2	Di-hybrid crossing
4.3	Interbreeding crossing
4.4	Variation
4.5	Polygenic inheritance
4.6	Genetic modification

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) Candidates failed to identify the free marketing channel where goods are sold to the highest bidder (Q1.1.1), probably due to them not understanding the term 'the highest bidder'.
- (b) In Q1.1.3 candidates failed to identify the process involved in the production of the product and moving it to consumers. Most of them chose B instead of A.
- (c) Most candidates could not distinguish between production factors and money and hence chose D instead of A in response to Q1.1.6.
- (d) Q1.1.9 was poorly answered because candidates could not identify the main types of gene mutation.
- (e) Q1.2.1 was poorly answered because most candidates chose H (advertising) as the method of promotion where consumers can taste a product. Candidates did not consider the correct answer C (in-store promotion) because they could only relate promotion deals to advertising.
- (f) Q1.3.3 was poorly answered because candidates failed to differentiate between Genetic Modification (GM) and Genetically Modified Organisms (GMO) and gave GMO instead of GM as the answer for a form of biotechnology that produces a genetically modified organism.

- (a) Teachers are encouraged to expose learners to a multitude of questions related to graphs and tables with an emphasis on making deductions from a graph, scenario or a table.
- (b) Past NSC examination papers can be used effectively to enhance learners' understanding of concepts. It is a known fact that learners who understand concepts well enough can use this information more effectively. The use of past examination papers also exposes learners to the different ways in which questions can be posed. The marking guidelines can illustrate how the responses to these questions will differ.
- (c) Teachers should expose learners to all the marketing concepts that are linked to agricultural products.
- (d) Agri-business plan and problems encountered when drawing a business plan challenged many candidates. Teachers are therefore urged to use charts and pictures that show activities taking place at each stage.
- (e) Teachers need to focus on all aspects of the content that are listed in both *CAPS* and the *Examination Guidelines*. There might be topics which have not been covered in recent question papers, but they remain important content topics.
- (f) Regarding the responses to open-ended questions, teachers are advised to expose learners to these types of questions in the classroom and encourage them to be

creative in thinking of valid responses. However, teachers must make learners aware that their responses must be valid, based on fact and in line with the requirements of the question. Open-ended questions can be obtained from previous NSC papers and can also be developed from media articles.

- (g) Case studies and diagrams were a challenge to second-language speakers as they failed to follow the story before answering questions. It is therefore suggested that the language used in the case study should be in line with the expected level of the learner and grade.
- (h) Learners should be given more exercises on graphs to be able to determine dependent and independent variables, correct calibrations and interpretations.

QUESTION 2: AGRICULTURAL MANAGEMENT AND MARKETING

Common errors and misconceptions

- (a) In Q2.1.1 picture C, some candidates incorrectly identified the marketing function as either 'storage' or 'processing'.
- (b) In Q2.1.2 a few candidates confused the advantages of packaging with the guidelines and hence they lost marks.
- (c) In Q2.2.1 most candidates were conversant with the drawing of the graph but they failed to correctly identify the dependent and independent variables. Consequently, the labelling of the axes was incorrect. Some candidates struggled with developing an accurate caption as well as indicating the correct units on each axis. Others failed to calibrate the x-axis correctly because they started with the highest figure on the left and finished with the lowest figure on the right.
- (d) In Q2.2.4 most candidates failed to identify the correct form of elasticity for Product 2.
- (e) In Q2.2.5 most candidates could not justify the elasticity/inelasticity of demand.

- (a) Learners must be told that they need to understand the context and be able to interpret the data before they respond to questions set on it. They should be shown how the heading is derived from the given data and how to compose the heading.
- (b) Learners must understand that if data or a scenario is given, unless indicated otherwise, the questions will be based on the data or scenario.
- (c) The learners must be taught how to label and calibrate the axes correctly. This will help avoid the wrong curve being drawn. Teachers could use a number of examples to practically demonstrate the skills of labelling and calibrating the axes.
- (d) When teaching, emphasise the actual difference between elasticity and inelasticity of both demand and supply. Teachers should discuss examples of products that are elastic or inelastic and why they are categorised as such.
- (e) Understanding a flow chart and what it represents should improve learners' ability to respond to questions based on it.

QUESTION 3: PRODUCTION FACTORS

Common errors and misconceptions

- (a) Q3.1.1 was poorly answered because candidates failed to identify the type of credit in the case study. This affected responses to Q3.1.2, Q3.1.3 and Q3.1.4 as candidates could not explain the type of credit indicated, identify problems with capital and state other ways of creating capital.
- (b) Candidates failure to define management and to identify the components of management is an indication of the lack of focus on key concepts. This resulted in poor performance in Q3.2.
- (c) Q3.4 was poorly answered because of candidates' failure to identify labour legislations.
- (d) In Q3.5 candidates failed to indicate an economic characteristic of land represented by the given statement. The required answer to Q3.5.1 was in the statement itself. Further, they could not state other economic characteristics of the land in Q 3.5.2 and name the methods that can be used to improve soil productivity in Q.5.3.
- (e) Candidates could not differentiate between *variable* and *fixed* costs and examples thereof in Q3.6.1. When responding to Q3.6.2, some candidates could not calculate the profit/loss of the budget. They subtracted the income from the expenditure instead of income minus expenditure. Some were unable to name the types of budgets on a farm when answering Q3.6.3.

Suggestions for improvement

- (a) It is recommended that teachers train learners to identify exactly what the question requires of them. Learners need to be taught the meaning of the action verbs used in examination papers, such as *describe, identify, deduce, motivate, differentiate, justify, and compare.*
- (b) During informal assessment tasks, learners should be exposed to activities which will enable them to analyse, comprehend and interpret information.
- (c) Case studies, diagrams and scenarios need to be included in assessment tasks given to learners during the school year. The aim would be to expose them to activities which would improve their skills in answering these types of questions. These interventions could assist in improving reading and understanding skills, the application of knowledge and awareness of how to follow instructions.

QUESTION 4: BASIC AGRICULTURAL GENETICS

- (a) In Q4.1.1 candidates failed to determine the genotype of the cow in the scenario.
- (b) Q4.1.3 was poorly answered because candidates failed to determine the phenotype of the F₁ generation in the punnet square. Many candidates indicated the genotypes instead of the phenotypes. Many candidates also indicated incomplete dominance instead of complete dominance and as a result they failed, in Q4.1.4, to provide reasons to motivate their choice of dominance.

- (c) Candidates failed to identify 'dihybrid crossing' displayed by the punnet square in Q4.2. They confused alleles with characteristics (colour and texture).
- (d) In answering Q4.3.1, candidates failed to differentiate between the homozygous and heterozygous individuals shown in the diagram. This affected the furnishing of reasons for their answers in Q4.3.2.
- (e) Candidates could not identify (Q4.4.1) and define (Q4.4.2) the genetic phenomenon *variation* illustrated in the scenario. In Q4.4.3 candidates failed to name the environmental factors affecting variation. Many candidates did not know the difference between climate and weather.
- (f) Candidates could not name the breeding system explained by heterosis in Q4.4.5. They could not distinguish amongst cross breed, upgrading, inbreeding and line breeding. In addition, candidates confused the types of crossing with the breeding systems, e.g. di-hybrid.
- (g) In Q4.5.1 candidates failed to identify and define 'polygenic inheritance' as well as calculate the length of the highest tomato plant when each of the two pairs of additive alleles contributed 10 cm to the base length. Most candidates multiplied 30 cm by 10 cm (i.e. 30 cm x 10 cm = 300 cm) while others added 10 cm to 30 cm, (i.e. 30 cm + 10 cm = 40 cm). Others divided 30 cm by 10 cm (i.e. 30 cm/10 cm = 3 cm).

- (a) The key to mastering basic genetics is the understanding of terminology. Learners should be able to describe concepts and provide practical examples to illustrate their understanding of the terms and concepts.
- (b) Teachers should give special attention to the basic crossing, genetic concepts and terminology in their teaching of this topic. Teachers must teach learners both monohybrids, di-hybrid, and F1 and F2 crosses as it is now included in the *CAPS*.
- (c) Teachers must inform learners that while it is good preparation to make use of past NSC papers, the responses to past questions will not necessarily suit a question in a future paper if the context of the question is modified. Learners should be discouraged from providing responses learnt by rote without judiciously assessing whether the response is fully valid or not.
- (d) Teachers need to specify that any letter of the alphabet can be used to represent the alleles. However, if letters are given in a question, learners are advised to use them. It is therefore important for learners to ensure that they read and understand the preceding statements before answering questions on genetics.
- (e) Candidates' responses to questions on genetics suggest that there could be content gap among teachers. Subject advisers should convene workshops to address the shortcomings in content knowledge.
- (f) The teaching of genetics should be enhanced by providing practical examples within the learning site as it applies to plants, flowers and livestock.
- (g) There should also be integration with Life Sciences, as genetics is taught comprehensively in Life Sciences.

CHAPTER 4

BUSINESS STUDIES

The following report should be read in conjunction with the Business Studies question paper of the November 2020 examination.

4.1 **PERFORMANCE TRENDS (2016–2020)**

The number of candidates who wrote the Business Studies examination in 2020 increased significantly by 45 821 compared to that of 2019. There was also a pleasing improvement in the pass rate this year. Candidates who passed at the 30% level comprised 77,9% of the cohort in comparison to 71,0% in 2019, while 57,0% achieved at the 40% level compared to 46,2% in the previous year.

The improvement in the level of performance which was noticed in 2019 gained further momentum in 2020 because of the sustained quality of teaching and assessment together with creative intervention strategies by teachers and subject advisors.

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
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
2020	207 045	161 224	77,9	118 100	57,0

Table 4.1.1 Overall achievement rates in Business Studies

Over the years there has been an improvement in candidates' responses to Section A questions as well as to source-based questions. Candidates understood the requirements of follow-on questions that were based on different scenarios in source-based questions. There has also been a great improvement in essay writing with correct layout and adequate responses to higher order questions.

The impact of various Acts on businesses and business strategies remain a challenge despite the recommendations made in the past diagnostic reports on learner performance. Many candidates avoid choosing the question containing questions based on Business Ventures.

Teachers are advised to teach and assess all topics equally. The impact of various Acts on businesses and Investments Securities have a greater weighting as these topics consist of many subtopics. Subject advisors should conduct capacity building workshops on the abovementioned and other challenging topics. They should ensure that quality informal activities are administered in schools during the 2021 academic year. Learners must be encouraged to conduct research on legislation that affect businesses as well as on forms of ownership and investments to keep abreast with the latest developments on these topics.



Graph 4.1.1 Overall achievement rates in Business Studies (percentage)

Graph 4.1.2 Performance distribution curves in Business Studies (percentage)



4.2 OVERVIEW OF LEARNER PERFORMANCE IN PAPER 1 AND PAPER 2

General comments

- (a) Candidates' performance ranges from average to excellent in Section A. The reason for the improvement in performance can be attributed to the fact that this section now consists of 30 marks each (60 in total) compared to 40 marks in the single paper in 2019.
- (b) Many candidates were able to quote verbatim from given scenarios and they seemed to understand the meaning of instructional words (verbs) that are commonly used in Business Studies. This was evident in their appropriate responses to middle- and higher-order verbs such as 'discuss', 'evaluate', 'advise' and 'recommend'.
- (c) Some candidates could not identify the correct concepts from the given scenarios and lost marks for their motivation simply quoted from the scenario. Others were not able to provide correct answers to follow-on sub-questions.
- (d) Although overall performance improved in Section A and Section B, some candidates continue to provide vague and incomplete responses to middle- and higher-order subquestions. This challenge had a negative impact on the quality of the Business Studies NSC results.
- (e) Some candidates displayed language barriers when responding to questions; they struggled to express themselves clearly, even though they may have understood the content. They managed to score part marks for vague responses.
- (f) Many candidates did not perform well in questions based on Business Environments (Q2 and Q5). This was very disappointing as all questions tested on this topic appeared in past NSC papers. This topic continues to pose challenges to many candidates despite the variety of resources that are available to learners as well as the structured informal activities that were administered during the 2020 academic year.
- (g) The average performance was better in Paper 2 (as compared to P1) due to many candidates responding well in questions based on Business Roles and Business Ventures.
- (h) It was pleasing to note that the majority of candidates attempted the essay-type questions and showed that they were familiar with the structure of an essay. This contributed to an improvement in learner performance in these questions.
- (i) It was, however, disappointing that a large percentage of candidates chose to answer questions based on Business Roles (Q3 and Q6) in Paper 2. It gave the impression that they only studied one main topic for this paper.
- (j) Many candidates, even the stronger candidates, still struggled to provide valid examples of recent developments and current trends in the subject, and subsequently lost the 2 marks allocated for originality in essay questions.

General suggestions for improvement

- (a) Learners must be exposed to Section B scenario-based questions as often as possible as part of informal written work and informal assessment. Teachers must make learners aware that they will be penalised for writing a motivation on a concept that was incorrectly identified from a given scenario.
- (b) It is advised that learners paste note 12.1 and 12.2 of the 2020 notes to markers in their activity books. This basically enlightens them on how marks will be allocated for action verbs, so that they can practise accordingly.
- (c) Learners must be encouraged to provide complete responses to questions that require middle- and higher-order thinking skills. Teachers should then mark these questions objectively using the guidelines as per note 12.2 of the 2020 marking guidelines. Ticks must be placed/split appropriately to avoid lenient and/or stringent marking.
- (d) Teachers should encourage learners to respond (verbally and written) in the languages of teaching and learning (LOTL) in the classroom. This should be the practice applied consistently throughout the teaching and learning process.
- (e) Teachers must endeavour to use practical examples of the different Acts that impact on businesses as well as business strategies. Learners must be given an assessment task consisting of contextual and essay questions for each Act, and these tasks must be assessed according to the principles of marking. Quality feedback on learner performance must follow. Learners must also be requested to reflect on their strengths and weaknesses on the topic being discussed.
- (f) It is important that learners are conversant with the strategic management process so that they are better able to understand the types of business strategies as well as the reasons why businesses use these strategies.
- (g) Business Ventures and Business Roles must be adequately taught and assessed at relevant points during the academic year. Learners need to have a deeper understanding of both topics if they wish to improve overall performance.
- (h) Learners must be encouraged to conduct research on topics that are dynamic in nature. They must realise that including recent developments and current trends, such as legislation, to their responses will lead to better marks for originality.
- (i) 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, Google or textbook. This may form the basis of an informal class 'competition'.

- Always strive to include Business Studies terminology in all informal assessment tasks, as well as during teaching.
- The meanings and expectations of verbs that are commonly used in Business Studies should be pasted in learners' books.
- Copies of the *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 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 degree of challenge of each question, as experienced by candidates.



Graph 4.3.1 Average performance per question in Paper 1



Graph 4.3.2 Average performance per sub-question in Paper 1

Sub-question	Торіс
1.1	Multiple choice questions
1.2	Missing words
1.3	Match columns
2.1	Business strategies
2.2	Strategy evaluation
2.3	Business sectors
2.4	BBBEE pillars
2.5	Labour Relations Act
2.6	PESTLE analysis
3.1	Employment contract
3.2	Salary determination methods
3.3	Employment contract
3.4	Internal recruitment
3.5	Benefits of a good quality management system

Sub-question	Торіс
3.6	Financial functions
3.7	Quality concepts
3.8	TQM element
4.1	Consumer rights
4.2	Porter's Five Forces model
4.3	Defensive strategies
4.4	Compensation for Injuries and Diseases Act
4.5	Induction
4.6	Placement procedure
4.7	Quality circles
4.8	TQM reduction of quality
5	Basic Conditions of Employment Act
6	Human Resources function

4.4 ANALYSIS OF LEARNER PERFORMANCE IN INDIVIDUAL QUESTIONS IN PAPER 1

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) In Q1.1.1 some candidates confused the *Consumer Protection Act* with the *National Credit Act* even though this type of question was asked many times in past NSC papers.
- (b) Candidates also had difficulty in recognising the different types of strategies. This was evident when they had to choose the correct business strategy from the four given options. The question required an application of content knowledge, as such, it posed a challenge to some candidates.
- (c) A fair percentage of candidates failed to note the difference between the public relations function and the marketing function in Q1.1.5. This content is normally covered at length in Grades 10 and 11, and it may not have been reinforced in Grade 12.
- (d) In Q1.2.2 a few candidates were not able to distinguish between the National Credit Regulator Act and the National Credit Act even though this question was asked in recent NSC papers. Others used the acronym (NCR) instead of the National Credit Regulator as this word was provided in the question paper. The same error was repeated in Q1.2.4 where some candidates wrote UIF instead of Unemployment Insurance Fund, as in the question paper.
- (e) Some candidates confused the meaning of *market penetration* with *development* in Q1.3.1. Candidates were expected to perform well in this question as this topic has always been assessed in past NSC papers.
- (f) Many candidates could not link affirmative action with the Employment Equity Act in Q1.3.3.
- (g) In Q1.3.5 some candidates confused the meaning of Total Quality Management (TQM) with continuous improvement to systems and processes as a TQM element.

- (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) Learners must be encouraged to use practical examples when explaining the meaning of different types of strategies. Teachers should explain the rationale for the implementation of these strategies to enhance their understanding.

- (c) Proper recap must be done of content covered in Grades 10 and 11. Learners must know the quality indicators of the different business functions.
- (d) It is important that learners gain a clear understanding of the National Credit Regulator to avoid confusing this concept with the National Credit Act. Teachers must explain the reasons why businesses that offer goods and services on credit should register with the NCR.
- (e) Learners should be encouraged to write the word(s) as they appear in the textbox to obtain marks.
- (f) Teachers should first recap ways in which businesses should comply with the Labour Relations Act, Employment Equity Act, Skills Development Act and Basic Conditions of Employment Equity Act before teaching the implications of these Acts on the human resources function. This will enable learners to understand how and why this function should comply with these Acts.
- (g) All concepts related to 'quality' must be taught in detail using practical examples so that a better understanding can be gained.
- (h) As a strategy to improve performance in multiple-choice questions, teachers must consolidate these questions from various NSC past papers and administer them as informal assessment activities, throughout the academic year.
- (i) Learners must be made aware that each question will have a correct answer and some destructors. It is therefore important that they read the question/statement and all the options given, before choosing the correct answer, in Section A.

SECTION B: LONGER AND PARAGRAPH QUESTIONS, USING CASE STUDIES AND INFORMATION

QUESTION 2: BUSINESS ENVIRONMENTS

A small percentage of candidates chose to answer this question. Although this question only consisted of three subtopics as per the *CAPS* requirements, the performance was very poor, recording an average of 38%, based on data from a random sample of candidates.

- (a) In Q 2.1 many candidates were able to name the types of integration strategies, but some confused the diversification strategies with integration strategies.
- (b) Some candidates confused the steps in strategy evaluation with the strategic management process in Q2.2. Others confused this question with either the steps in strategy formulation or steps in problem solving. Many candidates were not awarded marks for the following inappropriate responses:
 - Formulate the strategy
 - Implement the strategy
- (c) Many candidates performed well in Q 2.3. Most of them were able to quote the business challenges, classify them according to their business environments and state the extent of control the business has over each environment. Others could only name the extent of control linked to the identified business environment but not the challenges.

- (d) In Q2.4 many candidates explained the meaning of management control and skills development as BBBEE pillars instead of explaining the *implications* of these pillars for businesses. Others confused the implication of skills development as a BBBEE pillar with the purpose of the SDA.
- (e) In Q 2.5.1 many candidates confused the Labour Relations Act (LRA) with the Employment Equity Act (EEA) from the given scenario. They lost three marks in this question as they forfeited one mark for the motivation because the mark allocation for motivation depended on the correct identification of the concept.
- (f) Many candidates confused the discriminatory actions of the LRA with that of EEA in Q2.5.2. Candidates responses were based on 'unfair treatment and discrimination'. It appears that candidates did not read and make sense of the scenario properly.
- (g) Poor performance was recorded in Q2.6.1 and Q2.6.2 as many candidates could not explain how technological and environmental factors pose challenges to businesses. Other responses were based on strategies to deal with the challenges posed by these factors.

- (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) Practical examples are also effective when explaining the steps in strategy evaluation. Since the steps in developing a strategy have been removed from the 2021 Exam Guidelines, learners should not confuse the steps in *evaluating a strategy* with the steps in *developing a strategy*.
- (c) 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. Discriminatory actions must be explained in line with the purpose of LRA.
- (d) The rationale behind the pillars of BBBEE is to ensure full participation of the previously disadvantaged or black people in the economy of the country. Teachers must emphasise the fact 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 integrated when addressing this topic during the academic year.
- (e) Strategies must be devised to illustrate how PESTLE factors can pose challenges to businesses. Teachers are also expected to initiate class discussions for suggestions on how to deal with challenges.

QUESTION 3: BUSINESS OPERATIONS

The majority of the candidates attempted this question. Performance ranged from poor to average. The two subtopics, namely, Human Resources and Quality Performance were equally weighted. Candidates performed well on sub-questions that assessed Human Resources (Q3.1-Q3.4). However, poor performance was noted on questions that assessed Quality Performance (Q3.5-Q3.8). The latter remains a challenge and poor performance in this section has often been reported in previous national diagnostic reports.

Common errors and misconceptions

- (a) In Q3.2 most candidates were able to explain the differences between *piecemeal* and *time-related* salary determination methods, but weaker candidates could not explain the meaning of these concepts. It is pleasing to note that performance in this topic has improved in comparison to the 2018 and 2019 cohort.
- (b) Many candidates provided one-word answers such as 'dismissal', 'retrenchment' or 'retirement', instead of providing complete sentences as reasons for the termination of an employment contract in Q3.3. Other candidates gave examples of various types of misconduct that can lead to dismissal. Some candidates gave the example of 'death' as a reason for termination of an employment contract which was not accepted as the correct answer.
- (c) Although good performances were noted in Q3.4.1 as many candidates were able to identify internal recruitment from the scenario, some candidates still confused internal with external recruitment.
- (d) Many candidates who correctly identified internal recruitment in Q3.4.1, were able to discuss its impact on businesses even though some responses were vague and incomplete. There was also evidence of confusion between this question with the impact of fringe benefits on businesses.
- (e) In Q3.5 some candidates were not clear about the benefits of a good quality management system, often relating this to the impact of total client satisfaction as a TQM element. Many responses were based on customer satisfaction, and were only awarded two marks.
- (f) A few candidates confused the quality indicators of the financial function with those of the purchasing function. This appeared in the 2019 NSC paper, hence a better performance was expected.
- (g) The majority of candidates were able to identify the quality concepts from the given scenario in Q3.7 but some confused the meaning of *quality assurance* with *quality control*. This suggests that candidates did not read and understand the scenario properly, as the key words that distinguished the aforementioned concepts were clear in the scenario.
- (h) Poor performance was detected in Q3.8, mainly due to inappropriate responses, based on the benefits of a good quality management system, as tested in Q3.5. The impact of total client/customer satisfaction on a large business as a TQM element remains a challenge to many candidates.

- (a) Teachers are advised to use practical examples of the differences between piecemeal and time-related salary determination methods. Lower- and middle-order questioning can be effectively used in these topics, as a means to illustrate the difference.
- (b) Encourage learners to write full sentences on reasons for the termination of an employment contract. They should be made aware that only part marks will be awarded if they provide one-word answers and vague responses, in all assessment activities.

- (c) Teachers must provide opportunities for learners to conduct research on the impact of internal and external recruitment methods. This will enable learners to gain insight in this topic and be able to respond appropriately, to direct and indirect questions.
- (d) A clear distinction should be made between the impact of internal recruitment and the impact of fringe benefits. The former refers to the positives and negatives of promoting existing employees, while the latter refers to the positives and negatives of offering employees' incentives, house allowances etc.
- (e) Learners must be well conversant with the meaning of the quality concepts before they are taught the benefits of a good quality management system. It should be noted that the benefits of a good quality management system depend on the effective implementation of the quality concepts, as stated in the 2021 *Examination Guidelines*.
- (f) Teachers should administer baseline assessment activities on the quality indicators of business functions. Feedback from learner performance must be used to develop tailored intervention strategies that suit individual learners. As all business functions should be assessed equally during the academic year, teachers should administer source-based and direct middle- and higher-order questions on this topic.
- (g) Practical examples should be used to highlight the differences between the quality concepts. Learners should be encouraged to provide a detailed analysis of each concept. Teachers should identify key words in each concept that will be used to remind learners of the differences between these concepts.
- (h) 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 are the advantages and disadvantages of implementing these elements. Furthermore, teaching and learning should only focus on TQM elements that are outlined in the 2020 *Examination Guidelines* with specific reference to large businesses.

QUESTION 4: MISCELLANEOUS TOPICS

This question assessed both main topics and consists of direct and indirect shorter questions. Candidates' performance was generally poor in this question.

- (a) Some candidates did not mention the consumer rights as stipulated in the National Credit Act (NCA) in Q4.1. Others confused the consumer rights of the NCA with either human rights or consumer rights in terms of the Consumer Protection Act/CPA.
- (b) In Q4.2 some candidates were not able to identify the relevant Porter's Five model from the statements. Others provided incomplete names of the model such as 'competition' and 'threats or barriers to the market'. They were awarded only one of two marks for making this error.
- (c) A large percentage of candidates could not explain the types of defensive strategies in Q4.3. Some responses were incorrectly based on either the types of intensive strategies or diversification strategies. Many candidates were also confused by the difference between liquidation and divestiture. It is disappointing that candidates continue to perform poorly in this topic despite the many recommendations made in previous diagnostic reports.

- (d) In Q4.4.1 many candidates were able to identify the Compensation for Occupational Injuries and Diseases Act (COIDA) in the scenario, even though some omitted a word in the name.
- (e) Poor performance was observed in Q4.4.2 as many candidates had difficulty in recommending ways in which businesses can comply with COIDA. They simply copied statements used in the scenario. Others confused this question with the responsibilities of employers in promoting human health and safety; a topic that relates to Paper 2 under *Business Roles*.
- (f) A large number of candidates performed well in Q4.5.1 even though some responded on the aspects that should be included in an employment contract instead of an induction programme.
- (g) Many candidates had difficulty in explaining the placement procedure in Q4.6. They confused this topic with either the selection or recruitment procedure. Others simply explained the meaning of this procedure, and lost marks.
- (h) Poor performance was noted in Q4.7.2 as many candidates could not offer valid explanations on 'other roles of quality circles as part of continuous improvement to processes and systems'. Some confused this question with the impact of continuous improvement to processes and systems.
- (i) In Q4.8 as many candidates' responses were limited to one or two facts on ways in which TQM can reduce the cost of quality. A few candidates also confused this question with the quality indicators of the purchasing function and with the impact of TQM if poorly implemented by businesses.

- (a) The difference between the rights of consumers in terms of the Consumer Protection Act (CPA) and the National Credit Act (NCA) must be clearly explained. This can be achieved by comparing these rights in a tabular format.
- (b) Businesses apply Porter's Five Forces model to analyse their position in the market. It must be made clear that this model is used as a research instrument rather than as strategies to increase sales and market share. It must be clear to learners that this model assists businesses with answering questions such as *how* and *what* makes buyers, competitors and suppliers have power over the business.
- (c) Learners must be made aware that new entrants refer to other businesses that sell the same products in the existing market, for the first time, and that the power will depend on how easy it is for them to enter the market. New competitors can easily enter the market if it takes little time and money, whereas barriers refer to obstacles like legislation, that makes it difficult to comply with, in order to enter new markets. This distinction must be emphasised.
- (d) Teachers must be thorough in explaining the meaning of each business strategy and the difference between liquidation and liquidity. The latter relates to the Paper 2 topic of investment securities. Teachers must also take time to explain the reasons why liquidation is classified under defensive strategies. Businesses will first implement retrenchment and divestiture strategies to defend themselves and liquidation will be applied as a last resort.

- (e) Learners must be trained to use the correct words when required to give the full name of the Compensation for Injuries and Diseases Act (COIDA), or they can use the acronym as this is also allowed.
- (f) Teachers must constantly encourage learners 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.
- (g) 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. Learners must be reminded to provide complete sentences when responding to questions on the purpose of induction to avoid losing marks unnecessarily.
- (h) The placement procedure is done after a new employee has been successfully recruited. Learners must be made to understand that businesses use the information obtained from the job description and job specification to match the new employee's strengths, weaknesses and skills with the requirements of the new job or position. Reference must be made to the words 'successful or selected candidate' as this is an indication that placement takes place after recruitment.
- (i) Teachers must make it clear that that quality circles are a group of employees who meet regularly to consider ways of resolving problems and improving production in their organisation and that they are not involved in the actual production of a product. Learners must focus on what the quality circles do, e.g. they solve problems related to quality and implement improvements
- (j) Attention must be drawn to the main reason why businesses implement TQM elements, which is to reduce the cost of quality. It must be emphasised that the reason why businesses work closely with suppliers to improve the quality of material is applicable to both 'cost of reduction' and 'quality within the purchasing function'. This distinction can be clearly achieved through robust class discussions.
- (k) Content training on Quality of Performance is recommended so that learners are adequately prepared for the November 2021 NSC Paper 1. Teachers must encourage learners to study these topics and track their performance through the administration of formal and informal assessment tasks. This topic must be remediated to learners until they gain the insight necessary to respond adequately to middle and higher order questions.

SECTION C: ESSAY QUESTIONS

QUESTION 5: BUSINESS ENVIRONMENT: LEGISLATION

Few candidates choose to answer this question. The performance was generally very poor with an average of 28%, based on data from a random sample of candidates. With reference to the essay on the Basic Conditions of Employment Act, candidates copied their responses from the scenario as an essay introduction.

Common errors and misconceptions

- (a) The introduction of many candidates was not relevant to the topic in Q5.1.
- (b) In Q5.2 many candidates' responses were inappropriately based on the provisions of the Basic Conditions of Employment Act (BCEA) or the impact of this Act on businesses. Others confused the purpose of the BCEA with that of the Employment Equity Act and the Labour Relations Act.
- (c) In Q5.3 some candidates confused the meaning of *hours of work* with the meaning of *overtime* as a provision of BCEA. They also confused annual leave with hours of work. There were many incomplete responses noted, including a failure to mention the number of hours and the number of days. Part marks were awarded in such cases.
- (d) Candidates who attempted Q5.4 experienced difficulties in discussing the impact of the BCEA. A fair percentage of candidates did not attempt to answer this question.
- (e) The poor performance observed in Q5.5 was mainly due to candidates not being able to recommend ways in which businesses could comply with the BCEA. Responses were limited to 'fines and imprisonment'. This topic continues to be a challenge to many candidates despite sufficient resources that was made available to teachers and learners.
- (f) Many candidates were not able to quote recent information or current trends and developments to be awarded marks for originality.

- (a) Teachers must stress the importance of a valid introduction and conclusion that must be based on the specific topic chosen. They should not repeat facts or points given in the question, as an introduction and/or conclusion.
- (b) Teachers should provide a summary of the different Acts in a table format, so that learners can clearly see the difference between the different Acts. Teachers can also invite labour law attorneys or compliance officers to address the learners in the classroom (or virtually) about different legislation.
- (c) A clear distinction should be made between the purpose of BCEA with the purpose of EEA. The former gives effect to fair labour practices by establishing and providing for the regulation of basic conditions of employment. The latter deals with providing equal job opportunities to everyone and to avoid discrimination in the workplace. Teachers must emphasise the purpose, impact, discriminatory actions, penalties and ways to comply with the act before addressing the provisions, in their lessons.

- (d) Teachers must adapt or adjust their teaching styles to ensure that each provision is taught in detail and confusion is avoided. One approach is to use columns for all the provisions and then fit in content about each provision so that learners can see the difference.
- (e) It should be noted that the penalties for not complying with the BCEA are as a result of a business not complying with a compliance order served by labour inspectors or by not complying with a ruling by the labour court if they are found guilty.
- (f) Learners should be taught the impact and purpose as well as the provisions of the BCEA in context so that learners will not confuse facts and repeat them in different sections of the essay.
- (g) The recent development concerning paternity leave could be a relevant response under the provisions of the BCEA for originality. Teachers should engage learners in sharing information about recent development and trends from newspaper, magazine articles and other sources, on a regular basis.

QUESTION 6: BUSINESS OPERATIONS: HUMAN RESOURCE FUNCTION

Candidates' performance in this question ranged from average to good. Most candidates answered this question.

Common errors and misconceptions

- (a) In Q6.2 some candidates provided incomplete responses as they were expected to write full sentences on the selection procedure. Confusion of selection with recruitment and placement was also noted.
- (b) Candidates could not obtain maximum marks for job description and job specification as components of job analysis in Q6.3 as they provided vague and incomplete responses on this topic.
- (c) In Q6.4 some candidates included points that the interviewee should consider before the interview or the role of the interviewer and even how to respond to questions after the presentation, instead of focusing on the role of the interviewee during the interview.
- (d) Candidates mentioned the incorrect examples of fringe benefits, impact of external recruitment or benefits of UIF in Question 6.5 as well as many vague and unclear responses.

- (a) Teachers must scaffold the activities of the human resources function and inform learners that the selection procedure is done after the recruitment process. This process starts when submitting or receiving documents like CVs and other personal documents and ends when the prospective employee is offered employment. Placement is done after the employee has been inducted.
- (b) The job analysis components should be explained clearly. The recruitment process is done by compiling a job description (list of duties, etc.) followed by a job specification (list of qualifications and skills) in accordance with the requirements of a vacancy. Teachers must use practical examples to explain the differences between the two concepts.

- (c) Teachers should refer to the 2021 *Examination Guidelines* for guidance on relevant aspects that must be taught under the term 'interview'. It is essential that learners first understand the purpose of an interview as this includes exchanging information between the interviewer and interviewee. Learners will then be able to separate this information from the roles of both the interviewer and interviewee before and during the interview. Role play the process with learners so that they can clearly differentiate between these roles.
- (d) Learner responses on the *impact of* fringe benefits should not be based on *examples of* fringe benefits. The emphasis should be on the advantages and/or disadvantages of fringe benefits on businesses. Learners should write full sentences to obtain full marks.

4.5 DIAGNOSTIC QUESTION ANALYSIS OF PAPER 2

The graphs presented below are based on data from a random sample of candidates in the different provinces. The average performance in Q1 was good as this question consisted of ten sub-questions that assessed Business Ventures and Business Roles. Candidates did not perform well in Q4 which assessed the topic Business Ventures. However, they performed well in Q5, the essay question on Business Ventures.

A good performance was noted in Q3 & 6 which covered questions on Business Roles. It appears that candidates devoted more time in studying this topic than in Business Ventures as they did not perform well in Section B of this topic.



Graph 4.5.1 Average performance per question in Paper 2



Graph 4.5.2 Average performance per sub-question in Paper 2

Sub-question	Topic/s
1.1	Multiple choice
1.2	Missing words
1.3	Match columns
2.1	Non-insurable risks
2.2	Functions of the JSE
2.3	Compound interest
2.4	Limited and unlimited liability
2.5	Personal attitude
2.6	Leadership styles
2.7	Video conferencing
3.1	King Code principles
3.2	Team development stages
3.3	Unprofessional business practice
3.4	Triple bottom line elements

Sub-question	Topic/s
3.5	Employee wellbeing
3.6	Delphi technique
3.7	Environmental protection
4.1	Leadership theories
4.2	Preference shares
4.3	Insurance
4.4	Presentation
4.5	Social rights
4.6	Teamwork
4.7	Problem solving
4.8	Socio-economic issues
5	Forms of Ownership and Investment
6	Human Rights, Inclusivity and Environmental issues

4.6 ANALYSIS OF LEARNER PERFORMANCE IN EACH QUESTION IN PAPER 2

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

The performance of candidates in this question was good, even though some candidates confused the meaning of some concepts that were tested in Q1.3. This could be attributed to a weakness in understanding key words that are used to identify the meaning of Business Studies concepts.

- (a) Some candidates confused the meaning of RSA Retail Savings Bonds with unit trust in Q1.1.1. It appears as if candidates were not aware of the minimum amount that is required to invest in RSA Retail Savings Bonds.
- (b) Candidates had difficulty in identifying a factor that must be considered when handling feedback sessions in Q1.1.3 as some chose incorrect options that consisted of negative statements.
- (c) In Q1.1.4 some candidates confused the corporate social investment (CSI) focus areas with the corporate social responsibility programmes even though the examples of CSI focus areas are provided in the 2020 Examination Guidelines. This could be because this question was asked for the first time in the NSC examination in Section A.
- (d) Many candidates could not identify a co-operative as a form of ownership in Q1.2.2. Many opted for a non-profit company, which was an incorrect option. It appears that candidates were not familiar with this form of ownership as it was asked for the first time in the NSC examination.
- (e) Poor performance was evident in Q1.2.4 as many candidates confused the meaning of *unfair advertising* with *misleading advertising*. The reason for this error could be that candidates did not read the questions carefully as the distractor was very similar to the correct answer.
- (f) The majority of candidates could not identify the meaning of graphs from a given description in Q1.3.3 even though this question has been asked many times in NSC papers. It is assumed that assessment on this topic might have focused on the impact of visual aids and not the meaning of each visual aid.
- (g) In Q1.3.4 some candidates confused the meaning of a nominal group technique with brainstorming even though both concepts have been asked many times in the NSC examination.
- (h) The majority of candidates did not understand the importance of team dynamic theories in improving team performance in Q1.3.5 as they chose option A which was not the correct answer.
- (a) In addressing the RSA Retail Savings Bonds and unit trusts, teachers must emphasise the minimum amounts required. As it is expensive to invest in the former, many investors choose to invest in unit trusts, which require a minimum of R200 to open this investment account.
- (b) Learners must be aware that handling feedback after a presentation would require a presenter to have good communication and listening skills. Teachers can use role-play to highlight the factors that must be considered while presenting and handling feedback in a non-aggressive and professional manner.
- (c) A clear distinction must be made between the CSI focus areas and CSR programmes. It should be stressed that CSR programmes inform CSI focus areas which are aimed at rural, employee and community development. Learners must be encouraged to conduct research on businesses CSI focus areas so that they can gain insight in this topic.
- (d) Teachers are advised to recap and revise the characteristics, advantages and disadvantages of all the forms of ownership that are stated in the 2021 Examination Guidelines. It should be noted that co-operatives form part of profit companies as their main aim is to also make a profit.
- (e) Practical examples should be used when teaching the meaning and examples of unfair advertising. This will enable learners to identify the examples of unfair advertising from given scenarios and statements. It should be clearly pointed out that misleading advertising would generally mislead consumers about the quality and prices of products.
- (f) The meaning of the types of visual aids must be clearly understood before the impact of this topic is addressed, in lessons. Pictures of different types of visual aids used in lessons, will be more effective in providing a deeper understanding of this topic.
- (g) Teachers are advised to place more emphasis on the words *silently* and *aloud* when teaching the differences between the *nominal-group* technique and *brainstorming*. Understanding the meaning of 'nominal-group' will assist in understanding why employees must first generate ideas silently, on their own, before sharing them with others.
- (h) Teachers are advised to conduct a baseline assessment on the features of each team dynamic theory that was covered in Grade 11. This will enable learners to gain a better understanding of the importance of team dynamic theories in improving team performance. They will then realise that the team dynamic theories enable businesses to allocate task effectively to employees, based on their personalities and roles.

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

QUESTION 2: BUSINESS VENTURES

The performance of candidates who attempted this question was average. Candidates were expected to perform exceptionally well as some of the subtopics are practical in nature. Moreover, many learners consider this topic as less challenging than the topic Business Roles.

Common errors and misconceptions

- (a) In Q2.1 many candidates gave examples of business and individual assets instead of non-insurable risks. Some provided incomplete responses such as 'fashion' instead of 'changes in fashion'. Others confused the examples of non-insurable with insurable risks.
- (b) Some candidates did not write complete sentences on the functions of the Johannesburg Securities Exchange (JSE) in Q2.2 as required by the question.
- (c) In Q2.3.1 few candidates could not identify the average clause from the given scenario even though the word 'clause' appeared in the question. Others confused this concept with 'under-insurance' even though this question has been asked many times in the NSC past papers in both Sections A and B.
- (d) Some candidates wrote the incorrect formula for calculating the average clause in Q2.3.2. Others showed the correct workings but could not calculate the correct amount for the compensation. Candidates were expected to perform well in this question as this topic was asked in 2017 and 2018 NSC papers.
- (e) Poor performance was noted in Q2.4 as many candidates interpreted the meaning of limited and unlimited liability as having insufficient and sufficient capital. Other responses were based on limited and unlimited credit granting and debt.
- (f) Many candidates confused the roles of personal attitude in successful leadership with either the qualities of an entrepreneur or the characteristics of a leader in Q2.5. Other responses were based on ways in which leaders should motivate employees. This is a persistent error despite the recommendations that were made in previous Diagnostic Reports on learner performance.
- (g) In Q2.6.1 some candidates confused the democratic leadership style with either the transactional or liassez faire leadership styles in the given scenario.
- (h) Many candidates confused situations in which the democratic leadership style can be applied in the workplace with either the meaning or the impact of this leadership style in Q2.6.2. Other responses were based on the application of the autocratic leadership style in the workplace. The fact that this was a follow-on question also contributed to poor performance.
- (i) Q2.7 was poorly answered by many candidates as they confused the impact of video conferencing with either PowerPoint or interactive whiteboard. Others provided unclear and vague statements in this question. It is worth noting that this question was asked for the first time in the NSC examination.

- (a) Teachers should use a table to explain the differences between insurable and noninsurable risks using practical examples. A clear distinction must be made between insurable and non-insurable risk. Teachers must focus on the word 'risks' not 'assets' so that learners do not confuse the insurable and non-insurable risks with the types of assets that should be insured.
- (b) Teachers must encourage learners to write full sentences when explaining the functions of the JSE. Learners must know how marks are allocated to each fact when action verbs such as *explain* or *discuss* are used, as per note 12.2 of the 2020 marking guideline. Teachers should be aware that two marks will no longer be awarded for the following responses with effect from November 2021, due to it being merged into one valid point as 'raises primary capital by encouraging new investment possibilities.'
 - Raises primary capital
 - Encourages new investments
- (c) Teachers must ensure that learners have a clear understanding of the meaning of under-insurance before addressing the meaning of the average clause. Learners must be made aware that the average clause applies to property or assets that are underinsured, and it is used to calculate the proportion of the loss that must be paid to the insured when goods or assets are under-insured.
- (d) Teachers must ensure that learners understand and practise the correct formula for calculating the average clause. They must also insist that learners show all workings as they will be awarded part marks if the final answer is incorrect.
- (e) Teachers are advised to make a glossary of the meaning of concepts that will be used when teaching the forms of ownership. The concepts of limited liability and unlimited liability refers to the extent of loss that will be carried by the owners to pay for the debts of the business. Furthermore, limited liability and unlimited liability is also determined by the legal status of the specific form of ownership. These aspects must be clarified in lessons as well as in class discussions, or short assessment activities.
- (f) Class discussions should focus on the word 'positive attitude' when addressing the role of personal attitude in successful leadership. The focus should be on how a positive attitude contributes to a successful leadership. Examples of business leaders who became successful due to their positive attitudes must be used in these activities.
- (g) It is essential that the meaning and impact of each leadership style be clarified, before teaching the situations in which the leadership styles can be applied in the workplace, as this will facilitate a better understanding of the latter.
- (h) Teachers are advised to explain the impact of the seven visual aids stated in the 2021 Examination Guidelines. Practical examples and demonstrations could be used when teaching this content.

QUESTION 3: BUSINESS ROLES

Performance of candidates ranged from average to good as all subtopics that were assessed in this question appeared in the past NSC papers. The phrasing of some of these questions were, however, different.

Common errors and misconceptions

- (a) Although candidates generally performed well in Q.3.1 some candidates stated the King Code principles in numbers instead of words, e.g. King Code 1, 2 and 3 principles. Others provided King Code principles for good governance that were not covered in the 2020 Exam Guidelines.
- (b) In Q3.2.1 some candidates could not identify 'storming' as a stage of development. Others confused *storming* with *norming* as a stage of team development, applicable to the given scenario.
- (c) Many candidates confused the conflict resolution techniques with either the correct procedure to deal with grievances in the workplace or problem-solving steps in Q3.2.2. Others provided negative strategies on how businesses can handle conflict in the workplace.
- (d) In Q3.3 many candidates explained the meaning of abuse of work time instead of explaining how the latter pose challenges to businesses. Some responses were based on ways in which business can deal with abuse of worktime, which were not required by this question.
- (e) Good performance was noted in Q3.4 even though some candidates provided incomplete statements on the elements of the triple bottom line. Others could not correctly identify these elements from the given scenario.
- (f) In Q3.5 some candidates' responses were based on the provisions of the BCEA, while others confused this question with ways in which businesses can improve the wellbeing of communities instead of communities. Others gave examples of CSI projects that were not required in this question.
- (g) Poor performance was noted in Q3.6 as many candidates explained the meaning of a Delphi technique, or the application of this technique, instead of discussing the advantages of this technique. Others incorrectly perceived employees as experts who must complete a questionnaire.
- (h) Many candidates showed confusion in Q3.7 with regard to the responsibilities of employers and employees in protecting human health and safety in the workplace. Some responses were incorrectly based on the role of the health and safety representatives in protecting the workplace environment whilst others confused this question with the well-being of employees which was asked in Q3.5.

Suggestions for improvement

(a) Learners must be exposed to the King Code principles that are stated in the 2021 Exam Guidelines. They must then be expected to explain how businesses can apply these principles to improve their corporate governance. Direct and source-based questions must be administered when assessing this topic.

- (b) Practical examples and role play must be used when teaching the stages of team development. Teachers must place emphasis on activities that take place in each stage of team development. Learners could be given a project that requires them to work in teams. They must then be requested to reflect on their experiences in working with others, making special reference to the stages of team development.
- (c) Learners must understand that conflict resolution techniques deal with two employees who have different opinions or beliefs while grievance procedure focuses on the aggrieved employee. Furthermore, the conflict resolution techniques can be regarded as informal process since no minutes of the meeting is kept during the meeting. Learners must know that conflict resolution is about people while the problem solving is about solving a business problem. They should be advised to refrain from providing negative responses on how to deal with conflict in the workplace. The recommendations must be correctional rather than punitive in nature.
- (d) Teaching and learning should focus on how each unethical and unprofessional business practice pose challenges to businesses. Learners must be advised to refrain from explaining the meaning of each type of unethical and unprofessional business practice as these responses will not be credited. It is also important that learners are well conversant with strategies on how to deal with each unethical and unprofessional business practice that are stated in the 2021 Exam Guidelines. Learners must be advised that strategies must be relevant to challenges.
- (e) Learners must be able to explain the relationship between social responsibility and triple bottom line. Teachers must realise that this topic is taught under 'social responsibility' due to businesses being compelled to invest in CSI projects, which addresses 'profit' as one of the elements of triple bottom line. Furthermore, 'people' as another element of the triple bottom line elements, refers to the responsibilities of businesses to promote the well-being of their employees and community.
- (f) Teachers should use practical examples of businesses that promote the wellbeing of employees and request learners to conduct further research on this topic. Learners must know that CSI projects are aimed at increasing the standard of living of communities rather than the wellbeing of employees in the workplace. Learners must also know that the content of this topic is not the same as the provisions of the BCEA. It should be noted that businesses are not compelled to promote the wellbeing of employees as compared to the provisions of the BCEA that requires business to comply with this Act.
- (g) Teachers should ensure that learners first understand how businesses can apply the Delphi technique to solve complex business problems. This will enable them to appreciate the impact of this problem-solving technique. Learners must refrain from using the word 'employees' when referring to 'experts' as this would result in an incorrect answer.
- (h) It should be emphasised that ways in which businesses can protect the environment and human health in the workplace includes measures that can be taken to minimise environmental pollution and human health in the workplace. This topic should not be confused with the responsibilities of employers or the role of health and safety representatives in protecting the workplace environment. The latter focuses on adherence to safety measures in the workplace in terms of working with equipment.

QUESTION 4: MISCELLANEOUS TOPICS

This question assesses the TWO main topics of this paper and consists of direct short questions. Candidates' performance ranged from average to good. It is pleasing to note that the candidates were well prepared for this paper as they had studied both topics. This question was popular as reflected by the large percentage of candidates that answered it.

Common errors and misconceptions

- (a) Q4.1 was poorly answered by some candidates as the leadership theories were confused with leadership styles from the given statements. Others confused the transformational leadership theory with the transactional leadership style. It appears that the distinction between the leadership theories and leadership style are still not clear to many candidates.
- (b) Many candidates could not identify redeemable and participating preference shares in the given statements in Q4.2. Some wrote 'ordinary shares' instead of 'ordinary preference shares', while others confused the types of preference shares with the types of ordinary shares.
- (c) Although Q4.3 was generally answered well, some candidates explained the meaning of insurance instead of providing the advantages. Others confused this question with the benefits offered by COIDA, as a compulsory insurance. Some responses were based on the advantages of insurance for individuals, which was not a requirement of the question.
- (d) Although many candidates were able to quote verbatim from the given scenario in Q4.4.1, others were still unable to quote from scenarios. They provided incomplete quotes without essence.
- (e) Many candidates performed well in Q4.4.2 even though some candidates confused the factors that must be considered *during* a presentation with either *before* or *after*, and the handling of feedback in a non-aggressive and professional manner.
- (f) Poor performance was noted in Q4.5 as many candidates confused the social rights of employees with either human rights or cultural rights of employees in the workplace. Some only mentioned 'the right to clean water' as a social right. Candidates might not have been familiar with this question as it was the first time that it was assessed in the NSC examination.
- (g) Q4.6 was poorly answered by many candidates as they were not familiar with the phrasing of this question. Communication as a criterion for successful team performance was explained in terms of its general meaning and advantages, which are not covered in the Grade 12 content.
- (h) Some candidates had difficulty in identifying the force field analysis in the given scenario in Q4.7.1. Others confused this technique with a Delphi Technique. Some were able to identify this technique but provided an incorrect quote from the scenario, and many did not attempt answering this question.
- (i) Many candidates provided vague and incomplete responses on the advantages of creative thinking in the workplace in Q4.7.2. Candidates responses were limited to 'employees come up with new and innovative ideas'. Others confused this question with the benefits of diversity in the workplace. Candidates were expected to perform well in this question since it has been asked many times in the NSC examination.

(j) Good performance was noted in Q4.8 even though some candidates' responses included strategies to deal with poverty instead of unemployment as a socio-economic issue. Others repeated facts using different expressions.

- (a) Teachers should make a clear distinction between the leadership theories and leadership styles. It is advisable that the leadership theories must first be taught before teaching the impact of each leadership style. It should be pointed out that the leadership theories guide leaders on how to choose a leadership style that is relevant to current situations e.g. the charismatic leader will follow a transformational leadership theory as a guide on how to influence their followers to work hard.
- (b) Learners must be exposed to different types of assessment activities to test the types of preference shares so that they are able to respond to low, middle and high order questions on this topic. They must also be given a research project and be encouraged to debate on this topic.
- (c) Learners should be careful that they do not explain the advantages of insurance for individuals instead of for businesses. It is therefore important that relevant business examples be used when teaching this topic. A clear distinction must be made between compulsory and non-compulsory insurance so that learners are better able to explain the advantages for businesses under non-compulsory insurance.
- (d) Learners must be regularly exposed to questions based on scenarios and be taught how to quote verbatim from these scenarios. They should be penalised for writing incomplete quotes during the class activities. It should be noted that even though essence is acceptable, it is not a good teaching and learning practice.
- (e) Teachers should take time to explain the relationship between factors that must be considered when preparing a presentation and when presenting. Learners must be engaged in role play of these factors and then provide feedback on areas for improvement. It should be noted that presenters prepare for a presentation alone (at home) without an audience. These factors will enable them to conduct a good presentation. Key words such as credibility, sections, position and eye-contact must be used so that learners remember facts with more clarity.
- (f) The social rights of employees must be explained within a business context as these rights are aimed at taking care of the wellbeing of the employees. Teachers should make use of newspaper articles on businesses that promote social rights in the workplace to enhance understanding. They are advised to first give the examples of social rights in the workplace before explaining ways in which businesses can deal with these rights in the workplace. It should be noted that these recommendations are embedded in the examples of social rights, e.g. the right to protection means to register workers with UIF to provide adequate protection in the event of unemployment or illness.
- (g) Learners must be able to explain the meaning of each criterion for successful team performance. The focus should be on *what* team members should do to achieve their objectives. Therefore, each criterion serves as a guideline for successful team performance.
- (h) The four problem-solving techniques as stated in the 2021 *Examination Guidelines* should be taught in terms of the meaning, application, and impact of each technique.

Teachers must first recap the meaning and application of each technique to assess prior knowledge before teaching this content. Teachers must ensure that learners are exposed to different types of assessment tasks on this topic.

- (i) It should be stressed that creative thinking must focus on the positive impact of innovative ideas on businesses. The benefits of diversity in the workplace, which focus on the advantages of employing diverse people, should not be confused with the advantages of creative thinking, which focus on creative ideas. This distinction must be made clear to learners through detailed explanations and robust discussions.
- (j) Teachers must suggest various strategies to deal with unemployment as a socioeconomic issue. In so doing, they must ensure that learners do not confuse strategies to deal with unemployment and poverty. Subject advisors can provide relevant material to ensure that these strategies are adequately assessed during the academic year.

SECTION C: ESSAY QUESTIONS

QUESTION 5: BUSINESS VENTURES: FORMS OF OWNERSHIP AND INVESTMENT

This question seemed to be less popular as many candidates did not choose it. Those who answered this question did not perform well. A possible reason for poor performance could be that many learners tend not to devote time to study the forms of ownership as the assumption is that this topic was covered in Grades 10 and 11. On the other hand, many candidates were able to answer questions on investment as this topic is considered less challenging to many learners.

Common errors and misconceptions

- (a) Many candidates repeated the statement that were used in the question paper as their introduction to an essay question in Q5.1. Some candidates' responses were not relevant to any of the four sub-questions that were asked in this paper.
- (b) Although candidates performed well in Q5.2, some responses were based on how taxation contributes to the failure of partnership instead of the disadvantages of this form of ownership. Other responses were based on the characteristics of the partnership instead of explaining how the characteristic becomes an advantage or a disadvantage in this instance.
- (c) In Q5.3 many candidates provided general statements on the contribution of management and legislation to the success and/or failure of a private company. Some responses focused on the characteristics of a private company but they could not link them to success and/or failure factors. Some inappropriate and irrelevant responses were included, such as the differences between 'management' and 'leadership' and the duties of a manager. Some responses were based on partnership, which was assessed in Q5.2, instead of a private company.
- (d) Many candidates performed well in Q5.4 even though some could only name factors that should be considered when making investment decisions, but they could not explain the meaning of each factor.
- (e) In Q5.5 some candidates were able to discuss the impact of fixed deposits as a form of investment. Others confused fixed deposit with either the Government Retail Savings Bonds or unit trusts as a form of investment.

Suggestions for improvement

- (a) Impress upon learners that the introduction should reflect any one or two subquestions of the questions that were asked in the paper. Learners must be advised to refrain from repeating words or statements that were used in the question paper. They must be encouraged to write creative responses that will not be repeated either in the body or conclusion.
- (b) Learners should be asked to explain the characteristics, advantages and disadvantages of each form of ownership as stated in the 2021 *Examination Guidelines* as a baseline assessment. Teachers should identify learning gaps in this topic and attempt to close these content gaps, through focused activities. This topic must also be adequately assessed during the academic year as it is usually asked in all sections in the NSC examination.
- (c) The advantages and disadvantages of each form of ownership can be used as a point of departure to explain how each criterion contributes to the success and/or failure of the forms of ownership. Note that 'capacity' as one of the criteria that contributes to the success and/or failure of a business has been removed from the 2021 Exam Guidelines.
- (d) Learners must be exposed to various assessment methods including middle and high order questions on the factors that should be considered when making investment decisions. Teachers should identify key points when explaining each factor.
- (e) Learners must understand the meaning of 'fixed deposit' so that they are able to evaluate the impact of this form of investment on businesses. Teachers must emphasise words such as 'period and risk' when teaching this topic. Learners may be requested to bring recent newspaper articles and identify the advantages and disadvantages of fixed deposits from those articles.

QUESTION 6: BUSINESS ROLES: HUMAN RIGHTS, INCLUSIVITY AND ENVIRONMENTAL FACTORS

The responses of candidates to this question ranged from average to good. Candidates were expected to perform exceptionally well in this question as all four sub questions were asked as contextual questions in the 2018 & 2019 November NSC question papers.

Common errors and misconceptions

- (a) Q6.2 was fairly answered by many candidates, even though some candidates confused economic rights with the ways in which businesses could deal with cultural or social rights of employees in the workplace. Others confused this question with the provisions of the BCEA which are covered in Paper 1 under the topic Business Environments.
- (b) Poor performance was noted in Q6.3 as many candidates confused the role of the health and safety representatives with the responsibilities of employees in promoting human health in the workplace. Many others confused this question with strategies businesses may use to protect the environment and human health. Some responses were limited to 'ensure the workplace is clean'.

- (c) In Q6.4 many candidates confused the benefits of diversity with the advantages of creative thinking in the workplace, which was asked in Q4.3. Other responses were based on the purpose of the Employment Equity Act which is covered in Paper 1 under the topic Business Environments.
- (d) Some candidates' responses were based on the implications of management control as a BBBEE pillar that is also covered in Paper 1, instead of dealing with gender in the workplace in Q6.2.1.
- (e) Many candidates performed well in Q6.5.2 even though some responses were based on 'giving special treatment to physically challenged employees', which was not a correct response in this context.

- (a) The strategy of using four columns to indicate the four types of employee rights in the workplace, namely, human, economic, social and cultural rights is effective in addressing this topic. Learners should be made aware that the economic rights of employees focus on aspects that deal with fair labour practices.
- (b) 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 performs these tasks.
- (c) Learners should understand diversity as a concept (define/outline), identify workplace diversity issues (by means of practical examples or scenarios) and know how businesses should deal with these issues. Class debates and group discussions, focusing on ways businesses could deal with each diversity issue, will stimulate application and analytical thinking. Learners must be advised to refrain from giving examples of diversity issues as the focus is on how businesses should deal with these issues.

CHAPTER 5

ECONOMICS

The following report should be read in conjunction with the Economics question papers 1 and 2 of the November 2020 examination.

5.1 **PERFORMANCE TRENDS (2016–2020)**

The number of candidates who sat for the Economics examination in 2020 increased by 10 544 candidates in comparison to the number in 2019. This resulted in an increase of 6 904 candidates who passed at the 40% level, and an increase of 6 740 candidates at the 30% level. The percentage pass reflects a marginal improvement at the 40% level with 42,2% of candidates passing, and a slight decrease at the 30% level performance with 68,8% of candidates passing.

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
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
2020	118 484	81 536	68,8	49 958	42,2

Table 5.1.1 Overall achievement rates in Economics

Over the years there has been an improvement in the writing of essays, but the 8-mark higherorder 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 a general improvement in the drawing of graphs over the years, 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 relating to cost and revenue curves must be dealt with thoroughly in Grade 11 as this is the foundation for the more complex graphs 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)



Graph 5.1.2 Performance distribution curves in Economics (percentage)

5.2 OVERVIEW OF LEARNER PERFORMANCE IN 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.
 - Paper 1: Q1.3.3: A form of credit from the International Monetary Fund (IMF) which can be used when balance of payment difficulties are experienced. Q3.2.5: Why is it necessary for South Africa to standardise its economic indicators according to international requirements?

- Paper 2: Q2.3.5: Why does a negative externality result in the overproduction of goods and services? Q3.3.5: How can tourism have a negative impact on the economy?
- **Exposure to different types of questions:** Teachers play a crucial role in preparing 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. This gives them the opportunity to develop a variety of higher-order thinking skills in the context of the subject content being taught. Skilled learners are able to 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.
- **Problem-solving skills:** Learners should be challenged to solve everyday problems experienced in their own communities, e.g.:
 - Paper 1: Q3.5: Evaluate the success of Broad-based Black Economic Empowerment in the South African economy. Q4.5: How would consumers benefit from a policy of free trade?
 - Paper 2: Q2.5: Evaluate the impact of producer subsidies by government on the business sector. Q3.5: Why is investment in tourism important for the economy?
- 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 2021 year-end examinations, all learners should use past papers for the final examinations (2016–2020) and supplementary examinations (2017–2021) 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 2021 *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 2021 *Examination Guideline*. Previous question papers and marking guidelines should be used as revision tools but not as a teaching tool, as it encourages spotting of questions for the exams. Interpretation of questions is critical. Content should be continually assessed in line with the 2021 *Examination Guideline*.
- (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 2: Q2.4: Draw a fully labelled graph to show economic loss in a monopoly 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), candidates need 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.

Higher-order questions put advanced cognitive demand on learners. It encourages learners to think beyond literal questions. Higher-order questions promote critical thinking skills because these types of questions expect learners to apply, analyse, synthesise, and evaluate information instead of simply recalling facts. Issues from the real world can be used to either support or refute a point of view.

Higher-order questions require learners to make inferences, draw relevant and insightful conclusions and use their knowledge in new situations. It also requires them to relate their thinking to other situations and to their own background knowledge.

Time must be devoted to understanding the question clearly, for example:

- Paper 1: In Q5 many candidates discussed the role of the business sector in a circular flow model, instead of critically analysing how the business sector can contribute more positively to the economy.
- Paper 2: In Q2.5 (additional part) candidates had to evaluate the competition policy in promoting a more competitive economy, but instead they described the aims and institutions of the competition policy without referring to the extent on its success or lack thereof.

Teachers need to realise that there are many more ways to teach than by rote learning. There is teaching for understanding, decision making, problem solving, connecting a part to a whole, detail to concept, and concept to concept. There also is inference, prediction, analysis for bias, and learning for transfer. Each of these processes requires some form of critical thinking.

Opportunities for learners to develop critical thinking processes are not found in classrooms dominated by the regurgitation of factual content. They are found in classrooms where active learning is an essential component.

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: Why should government focus more on small, medium and micro-enterprises to drive the economy?
- Paper 2: Q6: Evaluate the success of international measures adopted to address environmental problems.
- (d) **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 learners 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.

(e) 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. In Section A, 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. There is a misconception that answers to 1-mark questions in the Data Response items, 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.
- **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 Guidelines*.

• Topics earmarked as possible essays in the *Examination Guidelines* should be thoroughly prepared for the examination. Spotting of questions underprepare candidates and lead to poor performance. In both Paper 1 and Paper 2, various essay topics were covered in lower- and middle-order questions. Paper 1 reflected a total of 64 marks on these questions (see Q2.2, Q2.4, Q3.1.1, Q3.2, Q3.3, Q3.4, Q4.4 and Q4.5) while Paper 2 reflected 46 marks on these questions (see Q2.2, Q2.3, Q2.4, Q2.5 and Q3.4).

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, Q2, Q3, Q4 and Q6 showed a decline from that in 2019. Candidates performed the worst in Q3 (Economic Pursuits) in 2018, 2019 and 2020. However, there was a considerable improvement in Q5 (Macroeconomics).





Q	Topic/s
1	Objective questions
2	Macroeconomics
3	Economic pursuits
4	Macro and Pursuits
5	Macroeconomics
6	Economic pursuits



Graph 5.3.2 Average performance per sub-question in Paper 1

Sub-question	Торіс
1.1	Multiple choice
1.2	Matching
1.3	Give a term
2.1	State revenue
2.2	Problems of public sector
2.3	Balance of Payments
2.4	Forecasting of business cycles
2.5	Devaluation
3.1	Foreign trade indicators
3.2	Economic Indicators
3.3	SEZs
3.4	Social indicators
3.5	BBBEE
4.1	Economic integration
4.2	Business cycles
4.3	Protectionism/Free trade
4.4	Regional development
4.5	Import substitution
5	Circular flow markets
6	Supply-side policy

5.4 ANALYSIS OF LEARNER PERFORMANCE IN EACH QUESTION IN PAPER 1

QUESTION 1: MACROECONOMICS AND ECONOMIC PURSUITS

Most candidates revealed a moderate performance 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 Q1.1.4 and Q1.1.7.
- (b) In Q1.2 candidates had to match an Economics term with given statements. In some cases, they changed their original answers without cancelling the first one, or left out certain answers by mistake. Generally, a lack of content knowledge impaired candidates' performance. They could not match the correct answers for autonomous consumption, JIPSA and Integrated Manufacturing Strategy. Poor performance was recorded for Q1.2.1, Q1.2.5 and Q1.2.8.
- (c) In Q1.3 candidates had to give an Economics term for a given statement, but they provided an abbreviation or acronym instead. Refer to 1.3.1 (EAP) and 1.3.3 (SDR). The marking guidelines accepted only the correct answer with no acronyms, abbreviations or examples. When candidates provided more than one answer, they were awarded no marks. This was a poor overall performance compared to that in 2019, especially in Q1.3.3, Q1.3.4 and Q1.3.5.
- (d) In Q1.3.3 candidates confused *loans* and *Special Drawing Rights*, and Q1.3.4 was a good example of typical answers from candidates reflecting broad knowledge rather than in-depth knowledge of the subject matter.

- (a) It is imperative that learners first attempt to determine the correct answer to a multiplechoice question before considering the given options. Furthermore, the format of Section A should be explained to learners to enable them to organise their answers correctly. In light of this, learners need to follow instructions such as answering Q1 in the answer book, 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 all basic economic concepts covered in the various topics, e.g. Q1.3.3, where Special Drawing Rights still form part of the financial account (under Other Investments) in the Balance of Payments. 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.

QUESTION 2: MACROECONOMICS

Common errors and misconceptions

- (a) Candidates could not name two sources of state revenue in Q2.1.1 and gave *taxes* and *direct taxes* or *sin tax* as examples instead. In Q2.1.2 candidates responded poorly on the purpose of the residual item, where the expenditure method is used to calculate national income.
- (b) Many candidates could not briefly describe the term accountability (see 2.3.3) as a problem experienced by the public sector.
- (c) Candidates who performed poorly in Q2.3.5 lost marks in the calculation of the current account. Candidates rewrote all figures given in the question paper or supplied only the answer.
- (d) In Q2.4 candidates struggled to explain composite indicators as a feature underpinning forecasting of business cycles.
- (e) Candidates failed to analyse the impact of devaluation on the economy (see Q2.5).

- (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, Balance of Payments 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 in these statistics, to answer questions appropriately (see Q2.1.2). Teachers should provide learners with additional notes on the five subaccounts of the financial account in the Balance of Payments (BoP), to ensure that learners know that Special Drawing Rights form part of Other Investments in the BoP.
- (b) There is a clear shift towards the learners' 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. how will the government benefit from privatising state-owned enterprises? (see Q2.2.4).
- (c) Teachers need to ensure that learners know how to calculate and derive figures from data given (see Q2.3.5 where candidates had to determine the value of the trade balance by showing all calculations). Learners should know that no marks will be awarded where all figures provided in the question paper, are copied as an answer, although some of the figures might be relevant.
- (d) Teachers must ensure that the teaching of concepts, data response and correct economic terminology is adequately done. They should ensure that learners know what is expected of them, based on the various concepts and the depth of knowledge explained in the *Examination Guidelines* (EG) of 2017 (see translation of smoothing of cycles on p.11 in EG and accountability on p.12 in EG). The teachers must also make use of print media in the classroom to acquaint learners with contemporary economic

issues. Subject advisors need to support educators by developing content-based documents that address challenging topics in economics.

QUESTION 3: ECONOMIC PURSUITS

Common errors and misconceptions

- (a) Many candidates misinterpreted the data-response questions (see Q3.2 and Q3.3). Most questions demanded thorough reading and interpretation.
- (b) Weaker candidates could not name the economic indicators related to foreign trade in Q3.1.1. Language still seems to be a barrier and candidates lost marks due to poor command of the language and not explaining concepts fully. Many responses were mainly generic and completely void of Economic reasoning.
- (c) Candidates found opinion-based questions challenging. In Q3.2.4 candidates could not explain how the unemployment rate is determined in the country. In Q3.2.5 candidates could not explain why it is necessary for South Africa to standardise its economic indicators according to international requirements and failed to associate content learnt and its contextualisation. This indicated a lack of general knowledge and interpretation skills, which was also evident in Q3.3.4 and Q3.3.5.
- (d) It would appear that current economic issues are not discussed on a regular basis in class. Candidates' responses were too generic and lacked factual knowledge (see Q3.5). Candidates could not evaluate the success of Broad-Based Black Economic Empowerment in the South African economy, in enough detail.

- (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) Teachers should emphasise that data-based questions (Q3.2 and Q3.3) cover middleorder responses. The action verbs *how* or *why* would not have the same expectations from the responses of candidates, compared to Q3.5 (a higher-order type question).
- (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.
- (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 explained Broad-based Black Economic Empowerment, 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) Many candidates could not answer Q4.1.1 where they had to name any TWO forms of economic integration (see *Examination Guidelines* p.16). Most candidates also performed poorly in Q4.1.2 where they had to explain what the focus of the National Research and Development Strategy is (see *Examination Guidelines* p. 22).
- (b) In Q4.2.4 many candidates could not give the reason why the endogenous school of thought encourages government intervention in the economy. Typical responses were job creation and production.
- (c) In Q4.3.4 candidates were unable to interpret the impact of protection on the value of the rand due to lack of exposure to the day-to-day functioning of the economy.
- (d) In Q4.3.5 the candidates' lack of grasping the economic concepts and relating them to real-life situations, resulted in their inability to explain how consumers would benefit from a policy of free trade.
- (e) In Q4.5 most candidates struggled to apply their knowledge on the evaluation of the success of import substitution as a South African trade policy. Candidates only discussed the content and referred to advantages and disadvantages of import substitution and did not meet the requirements of the cognitive level. They also lacked the skill to evaluate a certain aspect of the economy.

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.
- (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 wrongly explained the circular flow or the markets as introduction. This resulted in their forfeiting the 2 marks for the introduction. Candidates listed facts in broad terms in the main part of the essay and confused the role of markets and the participants to the Circular Flow. In the additional part, most candidates could not analyse a more positive contribution of the business sector to the economy.

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 2021 which clearly indicate all possible essay questions for the next three years. These essays should be prepared in advance to ensure excellent marks in the introduction and main parts of the essays. The fact that so many candidates are including topics not earmarked as essays, i.e. role/interaction of participants in the circular flow, is alarming.
- (c) Teachers should expose learners to numerous question papers to enable wider awareness of different types of questions. Learners should be exposed to questions on all levels of difficulty during class activities, tests and internal examinations.

QUESTION 6: ECONOMIC PURSUITS

Common errors and misconceptions

- (a) Most candidates could list the different components of the supply-side policy to promote economic growth, but tended to be generic in their discussions. A repetition of facts occurred under the various initiatives, e.g. job creation and infrastructural development.
- (b) The additional part, which demanded higher cognitive thinking skills, was poorly answered by most candidates, who struggled to explain and give their own opinions as to why the government should focus more on SMMEs to drive the economy.

- (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.

The performance in Section A increased by 5% when compared to that of 2019 with an increase in Q1.1 and a decrease in Q1.3. In Section B, candidates generally performed better in Q3 and Q4, while there was a marginal decrease of 1% in Q2. In Section C, candidates performed better in Q5 than Q6. A significant improvement of 14% was noticed in Q5 when compared to 2019, considering that the performance in Microeconomics over the years has generally been poor to average.



Graph 5.5.1 Average performance per question in Paper 2

Q	Topic/s		
1	Objective questions		
2	Microeconomics		
3	Contemporary economic issues		
4	Microeconomics and Contemporary economic issues		
5	Microeconomics		
6	Contemporary economic issues		



Graph 5.5.2 Average performance per sub-question in Paper 2

Sub-question	Торіс	
1.1	Multiple choice	
1.2	Matching	
1.3	Concepts	
2.1	Cost and monopolistic competition	
2.2	Monopoly	
2.3	Market failure and minimum wages	
2.4	Monopoly graph	
2.5	Producer subsidies	
3.1	World heritage sites	
3.2	Inflation	
3.3	Tourism and marketing	
3.4	Benefits of tourism	
3.5	Consumer price index	
4.1	Competition policies	
4.2	Kinked demand curve	
4.3	Combatting inflation	
4.4	Cost Benefit Analysis	
4.5	Investment in tourism	
5	Perfect markets	
6	Environmental problems	

5.6 ANALYSIS OF LEARNER PERFORMANCE IN EACH QUESTION IN PAPER 2

QUESTION 1: MICROECONOMICS AND CONTEMPORARY ECONOMIC ISSUES

Most candidates performed well in Q1 which was an improvement from the previous year. The performance of candidates ranged from excellent to poor. Some candidates attained full marks and a few did not even attempt to answer some of the questions. This question was compulsory.

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 section showed an improvement from 2019. However, there has been a decline in Q1.3.
- (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. Poor performance in Q1.1.4 can be attributed to the misunderstanding of social cost, which is made up of private cost plus external cost instead of private cost plus public cost. Sometimes the external cost has been linked to social cost.
- (d) Lack of understanding of what the fiscal policy entails was evident in Q1.1.7, when candidates failed to link *fiscal policy* to *combating inflation* by choosing option 'A'.
- (e) In Q1.3.1 *Pareto inefficiency* was given as an answer instead of *Pareto efficiency*. This implies that efficiency is a misunderstood concept.
- (f) Shut-down point was confused with break-even point and profit maximization point in Q1.3.2 and in some instances, even normal profit emerged as a response.
- (g) Candidates could not recognise the general manner in which Q1.3.6 was phrased, as it did not warrant a specific type of pollution as the answer. Answers related to the introduction of waste matter in a specific environment, e.g. water pollution, which was marked correct.

- (a) In Q1.1 learners should have written down 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.
- (b) In explaining Pareto efficiency, teachers must relate concepts of allocative inefficiency and productive inefficiency using the Production Possibility Curve and Indifference Curve. A good example to explain Pareto efficiency is to use a cake cut up into 20 slices. If this is divided amongst two persons e.g. 12 and 6 or 10 and 8, then this is not Pareto efficient as it is possible to increase the welfare of one without decreasing the welfare of the other because of two surplus units. Pareto efficiency will be an allocation of 10 and 10 slices or 12 and 8 slices. This would then satisfy the definition of Pareto efficiency.

- (c) Teachers must emphasise that the average variable cost plays a crucial role in determining shutdown point. A distinction must be made between average cost and average variable cost in relation to whether a business can continue operating or not. Comparing average cost to average revenue will determine break-even point, economic profit and economic loss. Shutdown point relates to average revenue equalling average variable cost. Marginal cost together with marginal revenue is used to determine profit maximisation.
- (d) Definitions and concepts should be emphasised. Use of a glossary should form the basis of teaching and learning in Economics.
- (e) 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 and was the worst answered question in Section B.
- (b) Many candidates misinterpreted Q2.1.1 by giving categories of costs (fixed and variable) instead of examples.
- (c) In Q2.1.2 candidates struggled with the concept, 'hybrid'. They referred to a combination of perfect and imperfect markets, instead of perfect and monopoly markets.
- (d) Candidates could not distinguish between the *demand curve of a monopoly and a monopolistic competitor* in Q 2.2.2. Most of them indicated a negative slope but did not indicate that the slope of the monopoly is relatively inelastic and that of a monopolistic competitor is relatively elastic or that one is less elastic that the other.
- (e) A lack of application of a concept in a certain context was evident in Q2.3.4 as candidates merely explained a negative externality without explaining how it caused an overproduction of goods and services. No reference was made to inefficiency in their responses.
- (f) In Q2.3.5 candidates' responses referred to minimum wages as low wages and thus discussed the negative aspects of low wages.
- (g) Candidates demonstrated a lack of knowledge as they drew the graph of a perfect market instead of a monopoly market. Those who drew the correct graph (cost and revenue curves) struggled to indicate economic loss correctly.
- (h) The most common response given to Q2.5 related to consumer instead of producer subsidies. Some candidates referred to subsidies as a tax that producers pay.

Suggestions for improvement

(a) Teachers should emphasise the difference between implicit costs and explicit costs, and try to relate fixed and variable costs to explicit costs with examples. Teachers could go one step further by explaining the difference between accounting profit and economic profit and how it relates to explicit costs and implicit costs. This will give learners a clear understanding of why normal profit in Economics is equated to breakeven point, taking into account explicit and implicit costs. This is very different to Accounting profit, where only explicit costs are considered in determining profit.

- (b) While the concept of 'hybrid' is not explicitly indicated in the *Examination Guidelines*, it is a concept that learners will come across under the characteristics of Monopolistic Competition. Teachers must be encouraged to mediate the content better to learners.
- (c) In the *Examination Guidelines*, a comparison of the four (4) four market structures is required. The 'demand curve' which is one of the criteria, should be explained clearly with reference to the slope of the demand curve for each market structure. This should range from the most competitive (perfect competition) to the least competitive (monopoly). Learners would clearly see the slope getting less elastic as one moves from a perfect market to a monopoly. Teachers must relate the elasticity, or lack thereof, to the degree of competitiveness within the market structure.
- (d) In explaining any factor that causes market failure, learners must be aware that it should relate to either productive and/or allocative efficiency. This would help in explaining how a factor such as 'negative externality' can cause market failure through over-production.
- (e) Teachers should focus consistently on assessing the drawing of graphs in Microeconomics from Grade 10 to 12 to reinforce the various concepts covered. Special attention should be given to labelling of curves and the labelling of key points. This is essential when the learner is required to explain the graph.
- (f) Teachers should ensure that learners draw graphs of equilibrium positions, while this is being illustrated on the chalkboard/whiteboard by the teacher. Teaching graphs via a PowerPoint presentation only, is discouraged. Instead, teachers should rather be a support to the actual drawing of graphs. The following method is suggested.
 - Determine which market is being tested i.e. perfect or imperfect.
 - Start by drawing the Revenue curves (D/AR, MR). Remember that in a perfect market it is horizontal and in an imperfect market it looks like chopsticks.
 - Then draw the AC curve followed by the MC curve. The AC curve should be drawn before the MC (smile and tick). This will make it easier for the learner to ensure that the MC cuts the AC at its minimum point.
 - The following important points should then be labelled i.e. Profit maximisation point, quantity and price, average revenue and average cost. This will serve to indicate the profit/loss position on a graph, and will help in the explanation, if it is required.
- (g) The explanation of the graph should follow the following basic steps irrespective of which market structure is involved.
 - Identify the 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 short term, long term or both.
- (h) 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 Q3.2.1 many candidates could not identify that the 'dotted lines' referred to inflation targeting. Many responses incorrectly reflected inflation as the answer.
- (b) The definition of the term *inflation* dominated most responses instead of *headline inflation* in Q3.2.3. This was also confused with administrative inflation and core inflation.
- (c) In Q3.2.4 there was a lack of understanding of how the expectation of rising prices will influence the consumption expenditure as candidates' responses related to the effect that inflation will cause prices to increase and lead to less buying by consumers.
- (d) Learners could not link tourism to the environment in Q 3.3.5. Most wrote about crime, which they thought was the only negative aspect of tourism.
- (e) Candidates performed poorly in Q3.5, with many not attempting this question. Learners could not describe the influence of CPI on the economy. They could merely describe CPI. They also referred to the differences between CPI and PPI instead of addressing the question.

- (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) More teaching time of inflation can help improve the understanding of the various concepts on this topic. Different types of inflation and inflation-related concepts (stagflation, hyperinflation, core inflation, disinflation and deflation) must be thoroughly explained and differences pointed out. Examples of countries that have experienced a particular type of inflation, should be given.
- (c) Learners must be exposed to more data-response questions i.e. 4-mark questions that require application skills. A thorough understanding of key concepts is necessary to interpret questions. Such questions should be discussed in class, with the emphasis on using the relevant data to address the requirements of the question. Logical reasoning would enable learners 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. It is also a misconception to expect all answers to come from textbooks.
- (e) Sufficient informal activities on high-order questions are crucial in preparing learners for formal assessment. Data-response questions should not merely require learners to copy answers from the given data. Learners should be able to apply the data in the appropriate context.

QUESTION 4: MICROECONOMIC/CONTEMPORARY ECONOMIC ISSUES

Common errors and misconceptions

- (a) Question 4.1.2 was fairly well answered. However, linking the two concepts proved to be a challenge for the candidates.
- (b) In Q4.2.1, the concept of elasticity is a concern, as candidates were unable to relate it to the kinked demand curve which has TWO distinct slopes.
- (c) Tacit collusion was explained as an agreement between producers to fix prices in Q4.2.3, instead of a dominant firm raising its prices with the hope that its competitors will follow suit.
- (d) In Q4.2.4 many candidates compared an oligopoly to that of a monopoly, instead of a monopolistic competitor.
- (e) Candidates were not familiar with the term *school of thought* in Q4.3.2. They assumed it relates to schools in general. Responses included explanations on private schools and public schools.
- (f) In Q4.3.5 candidates could only identify the monetary policy instruments but were unable to link how these instruments could reduce demand-pull inflation. Candidates also inappropriately described demand-pull inflation.
- (g) Q4.4 was answered poorly. Candidates could give the description of CBA but could not explain the reasons for it.

- (a) It is difficult to imagine teaching demand curves of the various market structures without some reference to elasticity. While this concept was taught in Grade 11, learners understand this concept when differentiating the demand curve between the different market structures. This relates directly to the competiveness of business.
- (b) There are many criteria in the *Examination Guidelines* that learners can use to compare the various market structures. Teachers are encouraged to develop a mnemonic so that it becomes easier to do a comparison. This will help to master the content of the characteristics of the various market structures.
- (c) A major factor in poor performance arises from incorrect interpretation of the question due to a lack of a thorough understanding of a particular concept. This negatively influences its application in a context that is relevant to the question. This compromises

logical reasoning. Teachers should be discouraged from providing marking guidelines to learners before they attempt challenging questions, as this prevents them from thinking critically about the question themselves.

(d) Higher-order questions should be discussed with learners in terms of the interpretation and expectations of a question.

QUESTION 5: MICROECONOMICS

In general, the level of performance in response to the question was satisfactory. This particular essay was popular. The candidates, however, performed poorly in the additional part.

Common errors and misconceptions

- (a) Many candidates answered this question as a comparison to other market structures. This, however, did not disadvantage them as they could still get marks for the perfect market. Some candidates' responses were in phrases instead of full sentences such as easy entry and exit, complete information, and homogenous products. Some were confused with the phrasing of the question, especially with the words 'without the use of graphs'. This confusion caused many candidates to avoid the question.
- (b) There is a misconception that since it was listed in the *Examination Guidelines* as a comparison between various market structures, a comparison essay question was expected. The question was on perfect markets, which allowed learners to mention many other aspects covered under this topic, and not necessarily characteristics.
- (c) Many candidates referred to the competition policy only. They struggled to relate how the competition policy would have either promoted or reduced competitiveness to the economy. This question required candidates to be aware of current issues in the economy, that are influenced by the competition policy, such as collusion, mergers, empowering small business and BBBEE issues.
- (d) Although guided in the question paper as to what a conclusion should entail, the writing of a relevant conclusion was a challenge for most candidates.

- (a) Teachers must ensure that learners are able to interpret questions correctly to avoid irrelevant information in their responses. They 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 practise how to structure responses to questions based on key issues.
- (b) Learners must practise answering higher-order questions. Teachers must unpack questions in a way that guides learners to focus on the key issues demanded by the question. Learners should be engaged in classroom discussions, which will promote their ability to interpret content and to think critically because of the feedback they get from others.
- (c) Regular essays must be given to learners as practice where teachers can focus on assessing the additional part and the conclusion of the essay, an area in which learners generally struggle.

QUESTION 6: CONTEMPORARY ECONOMIC ISSUES

In general, the level of performance in response to the question was poor to satisfactory. Not many candidates selected this question and those who did, did not do very well.

Common errors and misconceptions

- (a) Although a guideline was given, many candidates did not present their answers in terms of the structure expected by using subheadings.
- (b) The main part was answered fairly well. Candidates were credited for mentioning other environmental problems that were not in the exam guideline. Any discussion concerning the environmental problem was considered. This included the international measures related to the problem, although these measures were not explicitly included in the question.
- (c) In the additional part, candidates focused on the international measures, without evaluating the success of these international measures. Many also referred to the environment as their immediate environment or area of residence and described social problems in their area.
- (d) Many candidates wrote on the benefits of tourism instead of environmental problems. This suggested a lack of adequate preparation and spotting for the examination.

- (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. This was further compromised by the disrupted school year due to Covid-19. Some of these topics became self-study material which became a challenge for many learners.
- (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 the conclusion to the essay.
- (c) Basic content should not only be covered, but also linked to the creativity of learners in the practical application of each topic. Where possible teachers should link content to the real world and facilitate discussion to interrogate issues so that learning becomes more meaningful.

CHAPTER 6

GEOGRAPHY

The following report should be read in conjunction with the Geography question papers of the November 2020 NSC examination.

6.1 **PERFORMANCE TRENDS (2016 – 2020)**

The number of candidates writing Geography increased by 15 822 in relation to the 2019 enrolment. It was therefore disappointing that after significant improvement in 2019, the number of passes at the 40% and 30% levels decreased by 11 800 candidates and 2 354 candidates respectively. At the 40% level, percentage passes were achieved by 53,3% of the cohort compared to 46,2% in 2020, while at the 30% level, the percentage passes declined from 80,5% to 75,3%.

Table 6.1.1Overall achievement rates in Geography

Year	No. wrote	No. achieved at	% achieved at	No. achieved at	% achieved at
		30% and above	30% and above	40% and above	40% and above
2016	302 682	231 641	76,5	145 726	48,1
2017	276 771	212 954	76,9	138 704	50,1
2018	269 621	200 116	74,2	126 011	46,7
2019	271 807	218 821	80,5	144 755	53,3
2020	287 629	216 467	75,3	132 955	46,2

It is pleasing to note that candidates are attempting more questions in both paper 1 and 2 than in the past. As each question is sub-divided into several sub-questions, candidates can score some of the allocated marks for attempting the lower order cognitive response questions even if they are not able to respond to all the questions.

There has also been some improvement in candidate's achievement in the paragraph questions where responding in full sentences was an issue in the past. The tips provided in past diagnostic reports seem to have been implemented by teachers to an extent.

In the shorter response questions, candidates are showing an improved understanding of Geographical processes and can provide better explanations than previously. They do however, continue to struggle with the questions on Map Calculations and GIS in Paper 2.

In the 2021 NSC examination, Geography will be examined by way of two 3 hour papers which will include both theory content and map-work. Each paper will cover a specific part of the curriculum and will include a map-work component of 30 marks.



Graph 6.1.1 Overall achievement rates in Geography (percentage)

Graph 6.1.2 Performance distribution curves in Geography (percentage)



6.2 OVERVIEW OF LEARNER PERFORMANCE IN PAPER 1

General comments

Areas of concern that were raised in the 2019 Diagnostic Report remain pertinent in the context of the 2020 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. In all but one of these questions (Q1.2; 8 marks) candidates achieved an average score over 60%.
- (b) In general, there was an improvement in the number of good performances. There were many high-quality responses to the question paper which indicate good understanding of geographical processes. However, there were still several candidates who struggled to answer some of the questions set, even at the lower-order level.
- (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 'discuss', 'suggest', 'identify', 'evaluate', 'describe' and 'explain', require different types of responses. 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. matching the description to the wind A or B; matching the statement to a low- or high-pressure cell; multiple-choice questions; matching items and choosing the correct answer from the words in brackets. Candidates, however, had difficulty discerning when to provide correct quotations as was required in Q2.4.2 (2 marks), Q3.6.2 (2 marks) and Q4.6.3 (1 mark), or when to provide evidence from a text where no quotation was necessary as in Q1.5.2 (1 mark), Q1.5.3 (1 mark) and Q3.5.2 (2 marks).
- (e) **Two- to four-mark questions**: These data response-type questions, where a discussion and more detailed reference was required, were often poorly answered. 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. They were also unable to demonstrate an understanding of command/action words like suggest, explain and describe. The question *why* was used numerous times in the question paper and candidates struggled to provide answers to such questions.
- (f) Paragraph-style questions: (8 marks) These questions were of middle- to- higher order as is the norm. In particular, Q1.4.4 (8 marks) on the destructive nature of line thunderstorms, Q3.5.4 (8 marks) on how increasing beef production can contribute to food security and Q4.3.4 (8 marks) on the unfavourable environmental conditions caused by urban sprawl were not well answered. It is evident that candidates were not taught the necessary content and skills to interpret and answer these types of questions. Candidates often did not provide answers in full sentences as is required. Some candidates did not always heed the command words used in these questions to formulate the correct response in line with the question asked.
- (g) Many candidates did not have a sound knowledge of the basic geographic concepts and therefore were not be able to answer questions of a high cognitive demand. Some examples are strategies to protect deltas (Q1.5.5; 8 marks); the negative impact of river rejuvenation on storage dams (Q1.6.6; 4 marks); the fluvial processes a river undergoes to become graded (Q2.6.4; 8 marks); how increased beef production can

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contribute to food security (Q3.5.4; 8 marks); the unfavourable environmental conditions caused by urban sprawl (Q4.3.4; 8 marks) and the positive impact of the new investment project on Saldanha Bay Industrial Development Zone (Q4.5.4; 4 marks).

(h) Most of the major topics mentioned in the *CAPS* were tested with the exception of Urban Hierarchies, land-use zones, primary activities such as mining and types of industries.

General suggestions for improvement

- (a) Candidates continue to struggle with action words that demand a higher cognitive level. Questions containing these action words should always be answered in full sentences, showing a clear knowledge and understanding of geographical content. Specific action words that were deemed difficult in this examination were: 'evaluate' and 'suggest'. Included in the updated *Examination Guidelines* for Grades 10-12 is a comprehensive list of typical action words used in Geography and the response required to meet the intention of the action word. Teachers are encouraged to make this list available to their learners and to use the words in class daily to illustrate how questions can be asked using these action words.
- (b) Two- to four-mark questions require some interpretation technique and understanding of geographic processes. Learners, therefore, cannot merely reproduce knowledge gained in the classroom. Responses should be extracted from the source material given as well as the 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 places them on a higher level of cognitive demand. Learners will be expected to answer two paragraph questions in both Paper 1 and 2 according to the new format. The response to these questions should be presented in full sentences, 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 wasting of valuable time.

When planning a response, learners should underline or highlight the main topic of the question, the action word and the focus areas of the question. 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, for example Q2.6.4 (8 marks), that must be linked to answer the question fully. 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.

(d) 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 and carry 1 mark each (Q1.6.1; Q2.4.1; Q2.5.1; Q3.3.1; Q4.3.1 and Q4.4.1). As these are seen as concepts, they do not have to be explained verbatim.
- (e) 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 (Q2.4.4; 8 marks). Learners should also be able to differentiate between the environmental, physical and social impact on a particular phenomenon in Geography. Questions that are regularly asked include: Q2.3.5 (4 marks) and Q4.3.4 (8 marks). Social, environmental, and economic justice issues are often assessed as in this examination in Q4.4 (15 marks). 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 websites to visit that will provide up-to-date and valid information.
- (f) 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.
- (g) Teachers are encouraged to include source-based questions in class assignments, tests and examinations. They should make use of 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 (line graphs, bar graphs and pie charts). 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. As the interpretation of cartoons remains a challenge for learners, 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; 15 marks). 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. If learners are asked to provide evidence from the text, they then are not expected to quote directly.

- (h) Teachers should become proficient in adapting diagrams and combining resources 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 which teachers can download on specific topics in addition to the considerable printed media items available. Teachers should check the validity and accuracy of material from the internet as it is not guaranteed to be correct. Reliable geographical sources should be used where possible and these should be properly contextualised.
- (i) 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 2021, the new Examination Guidelines will be in place. Details regarding the choice of agricultural product, mineral, core industrial areas, Spatial Development Initiatives (SDIs) and Industrial Development Zones (IDZs) to be studied are included.
- (j) 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.

- (k) Teachers should provide each learner with a copy of the new *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. It is particularly important to study the document this year as there is a new format for the two papers.
- (I) 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 learners with the style of question-setting and how questions are scaffolded, from those testing lower-order cognitive skills, to the higher-order questions which address more advanced thinking skills. Previous question papers must not, however, be used as a tool for predicting future papers.
- (m) 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. If too many lower-order questions are asked in the internal assessment conducted at school, learners will not be exposed to questions addressing a higher cognitive demand as asked in the final NSC examination. This will give learners false notions of the level of performance required.
- (n) Learners should always provide units of measurement or compass direction when giving answers about temperature i.e. °C, wind speed (knots), atmospheric pressure (hPa/mb), direction of movement (e.g. eastwards) or population numbers in millions. Q3.3.2 (1 mark) required candidates to determine the total population (in millions) of rural inhabitants in South Africa in 2004. Candidates who did not indicate the unit of millions were not credited with the mark.
- (o) 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 exam paper. Learners must read the instructions carefully before answering the objective questions. In match the column questions, multiple choice or match the statement to wind A or B (Q1.1.1) only the relevant letter next to the question number is required. Candidates who write down the words or terms might be penalised for not obeying the instructions.
- (p) In addition to making use of 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. Teletutor has embedded QR codes which when clicked on leads the learner to a short explanatory video of a section of Geography. Exemplar papers showing the new Geography paper format will be available later in the year.

(q) From November 2021 the format of the Geography examination will change. Geography content will be tested over two equally weighted question papers of three hours each. Paper 1 will test Physical Geography (Climate and weather and Geomorphology) and Mapwork and Paper 2 will cover Human Geography (Settlement and Economic Geography) and Mapwork. There will no longer be any choice questions in either question paper. Both question papers are marked out of 150 marks. Full details are provided in the abridged CAPS document and the 2021 Examination Guidelines. Exemplar papers to assist teachers will be made available in due course.

6.3 DIAGNOSTIC QUESTION ANALYSIS FOR PAPER 1

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



Graph 6.3.1 Average performance per question in Paper 1

Q	Topic/s
1	Climate and Weather and Geomorphology
2	Climate and Weather and Geomorphology
3	Rural and Urban Settlements, and Economic Geography of South Africa
4	Rural and Urban Settlements, and Economic Geography of South Africa



Graph 6.3.2 Average performance per sub-question in Paper 1

Sub-question	Торіс
1.1	Valley climates
1.2	Drainage patterns
1.3	Mid-latitude cyclones
1.4	Line Thunderstorms
1.5	Deltas
1.6	River rejuvenation
2.1	Low- and high-pressure cells
2.2	Drainage Basins
2.3	Tropical cyclones
2.4	Urban climates
2.5	River capture
2.6	River profiles
3.1	Models of urban structure
3.2	Economic sectors
3.3	Rural depopulation
3.4	Urban problems-traffic congestion
3.5	Cattle farming
3.6	PWV Gauteng Industrial region
4.1	Rural settlement patterns and shapes
4.2	Primary activities
4.3	Urban sprawl
4.4	Urban justice issue
4.5	Saldanha Bay IDZ
4.6	Informal sector

6.4 ANALYSIS OF LEARNER PERFORMANCE IN EACH QUESTION IN PAPER 1

QUESTION 1: CLIMATE AND WEATHER, AND GEOMORPHOLOGY

Common errors and misconceptions

- (a) Candidates did not score well in Q1.2 (8 marks) which were short objective questions based on matching the description/characteristic of a particular *drainage pattern* to the various drainage patterns given. The candidates struggled to make this connection without having diagrams as a reference.
- (b) Q1.3 (15 marks) recorded the lowest percentage in Question 1. The topic is that of mid-latitude cyclones which is tested in some way for each examination and should consequently not be overly challenging to candidates. Q1.3.4 (2 marks) and Q1.3.5 (4 marks) proved to be beyond the scope of most candidates. These questions were asked in a slightly different way than usual and this could have resulted in the candidates' poor performance.
- (c) In Q1.4.4 (8 marks) the paragraph question on the destructive (harmful) nature of *line* thunderstorms was not well answered. To be awarded marks candidates had to link the associated weather conditions like heavy rainfall and lightning with the possible effects of it on the natural or built environment, people and infrastructure. This question was not a higher-order question but a rather a middle-order question with a higher level of difficulty.
- (d) Candidates did not perform well in Q1.6 (15 marks) on river rejuvenation, achieving only a 43% average. Q1.6.5 (a) and (b) (4 marks) required the candidates to identify changes in the river channel and meander after rejuvenation occurred. They had to make a comparison between the two diagrams which they found a challenge.

Suggestions for improvement

- (a) When teaching drainage patterns, it is important for learners to have diagrams to illustrate the various examples that are found. However, it is just as important for them to be able to know the characteristics of each pattern based on an explanation. It is not mandatory to have a visual stimulus in the short objective questions.
- (b) Q 1.3.4 (2 marks) required candidates to say why the cold front of the mid-latitude cyclone is associated with severe weather conditions. The cold front has a very steep gradient resulting in maximum uplift of warm unstable air in the warm sector directly ahead of the front. The cold front and air behind the cold front is dense and heavy and as a result can only move horizontally resulting in rapid uplift of the warm sector air ahead of the front. As the cold front passes, winds become gusty as backing takes place (winds that change direction in an anti-clockwise manner), temperatures drop dramatically, heavy rainfall occurs. Lightning, hail and thunder can result if conditions intensify. Rising warm unstable air ahead of the cold front, condenses to form cumulonimbus clouds which have a great vertical extent. The atmospheric pressure reading will show an increase as the front passes.

An illustration of this concept can be obtained using the following link: <u>http://acomputerscientistlearnsaws.blogspot.com/2017/05/chapter-11-cold-fronts-and-cloudfront.html</u>

Geography

In Q1.3.5 (4 marks) many candidates did not recognise that the mid-latitude cyclone was in its occluded stage. An occlusion occurs when the cold front catches up the warm front at the apex of the low-pressure system. An occlusion is usually symbolised by the alternating symbols for a cold and warm front together close to the low-pressure centre of the system.

Teachers should use up-to-date synoptic weather maps as a teaching tool to show learners how each stage of a mid-latitude cyclone is represented. A good site is <u>https://www.weathersa.co.za/home/historicalsynoptic</u> which has synoptic weather maps for past years and seasons.

- (c) Line thunderstorms are classified as a travelling disturbance associated with anticyclonic circulation over South Africa. Q 1.4.4 (8 marks) required the candidates to explain how the various elements within line thunderstorms cause destruction. These thunderstorms result in torrential rainfall, gale force winds, lightning, hail and thunder which can damage property, cause flooding to occur, wash away crops and livestock and destroy the natural eco-system. As this explanation was required in the answer to this question, the candidates were expected to make the link between an aspect of the line thunderstorm and the destruction it caused.
- (d) River rejuvenation is a topic that is regularly tested and as such teachers need to cover this section thoroughly in class using as many different sources as possible. Usually there is a before and after diagram where one can see exactly what changes have taken place as the process occurs. Learners must be able to identify features like a knickpoint, the rejuvenated river with a valley within a valley, and possible terraces visible. They might also be asked to describe the changes visible in the river channel and meander from the before and after diagram as was asked in the November 2020 paper. An illustration of this concept can be obtained using the following link: https://www.quora.com/How-can-you-describe-the-river-rejuvenation-process

QUESTION 2: CLIMATE AND WEATHER, AND GEOMORPHOLOGY

Common errors and misconceptions

- (a) Candidates could not explain how the intensity of the tropical cyclone increased from area A to area B in Q2.3.3 (4 marks).
- (b) In Q2.4.3 (4 marks) candidates confused the explanation for why the urban *heat island* is more concentrated at night with the formation of a pollution dome.
- (c) With regard to Q2.5.4 (4 marks), candidates could not explain the process of river capture that resulted in the formation of a misfit stream.
- (d) Q2.6.4 (8 marks) was a paragraph-type question in which candidates could not easily make the link between the fluvial processes occurring at various stages along a river for a river to become graded. The two topics of fluvial processes and characteristics of a graded river were tested together which seemed to be beyond the ability of many candidates.

Suggestions for improvement

(a) In Q2.3.3 (4 marks) candidates had to use the diagram showing the position of the tropical cyclone in area A and area B in Figure 2.3. Area A is in the middle of the Indian Ocean just above Madagascar and as yet there is no characteristic symbol evident yet as it is still classified as a tropical depression. As the system moves towards area B, it

moves over the warmer Mozambique channel where increased evaporation takes place. This moist air mass will condense releasing latent heat which drives the tropical cyclone and intensifies it. The characteristic symbol for a tropical cyclone is now evident (•). The system is seen to be moving more rapidly in a westerly direction, there is evidence of an eye having formed and the wind speed increasing from gale force to hurricane strength over a short period of time.

Below are the characteristic symbols used to distinguish between the different stages of the intensity of a tropical cyclone in the Southern hemisphere.



Teachers are encouraged to alert their learners when a tropical storm or cyclone develops close to the east coast of South Africa. As a class, they can monitor the movement and how it intensifies over a period. Learners can also then see first- hand the extent of the damage caused by these tropical cyclones when they start to move towards the coastal areas. Cyclone Eloise (25 January 2021) is a prime example.

- (b) An *urban heat island* can develop above a city during the day due to increased activity, type of building material and building density within the city compared to the surrounding areas which are cooler. At night there is no isolation which reduces the strength of the convection currents, therefore subsiding air dominates over the city at night. This subsiding air pushes the warm air from the heat island down towards the buildings in the city. This heat occupies a smaller area than before and is therefore more concentrated. The buildings in the city also trap the heat between them. This results in warm temperatures being recorded in the city at night. Teachers need to stress that this concentrated heat island at night is different to the formation of a pollution dome.
- (c) Q2.5.4 (4 marks) tested the understanding of the process of river capture. A misfit stream is a stream that is robbed of its water source due to a stronger, more energetic river capturing it in the process of river capture. Refer to diagram on river capture on page 6 of the Annexure in the NSC November 2020 question paper. There is a watershed (a high-lying area separating two drainage basins) indicated on the diagram by a dashed line. The river above the watershed is flowing over a gentle gradient and is therefore less energetic. The river flowing down from the watershed is flowing over a much steeper gradient and is more energetic. This river starts to erode headwards (cut back) through the watershed where it intercepts the slow flowing river. The more energetic river is known as the captor stream as it has stolen the water supply from the river now called the misfit stream. A misfit stream will have a reduced water supply until it eventually dries up as it has had its headwaters stolen through river capture.

Learners need to master the interpretation of before and after diagrams, such as with the diagrams on river capture and be able to explain the geomorphological processes that resulted in the changes occurring.

(d) River grading is a topic often tested in relation to long profiles of rivers. In this case the process of grading was tested along with the fluvial processes that will result in a river becoming graded. Q2.6.4 (8 marks) required an explanation of the processes of erosion, the transportation of material and lastly the deposition of this material. There

is a strong relationship between the gradient, type of fluvial process and ability to transport eroded material. Downward erosion dominates in the upper course causing a steep valley slope. Headward erosion can remove any temporary base levels of erosion like a waterfall or rapid. In the middle course the gradient is more gentle and lateral erosion takes place. In the lower course due to the almost flat gradient the carrying capacity of the river is reduced and the transported material is deposited. As a result of all of these processes, the river will become graded and now have a concave shape. This shows that there is equilibrium between the erosion and deposition processes. An illustration of this concept can be obtained using the following link: Slide 32 https://www.slideshare.net/jlanser/river-profiles

Teachers should always use explanatory diagrams when teaching this section so that learners can clearly make the connection between the change in the river profile and the fluvial processes responsible for the changes.

QUESTION 3: RURAL AND URBAN SETTLEMENTS, AND ECONOMIC GEOGRAPHY OF SOUTH AFRICA

Common errors and misconceptions

- (a) The cartoon in Q3.4 (15 marks) showing traffic congestion was misinterpreted by many candidates.
- (b) Q3.5 (15 marks) on cattle farming in South Africa was not well answered. The paragraph question Q3.5.4 (8 marks) discussing how an increase in beef production can contribute to food security in South Africa proved to be beyond the scope of many candidates.
- (c) Candidates struggled to answer Q3.6 (15 marks) that required a more in-depth knowledge of the PWV (Gauteng) core industrial region. There was only a short text and a map of the area with a couple of cities indicated. Candidates who were not well prepared for this question simply gave various parts of the text as answers. This question was the most poorly answered question with an average of 42%. It is surprising as this core industrial area has been asked in the last three examinations as it is one of the two pre-selected areas of study.

Suggestions for improvement

(a) Cartoons, as asked in Q 3.4 (15 marks), are not an easy stimulus for all candidates. Teachers must use at least one cartoon in each test or examination to allow their learners to get used to interpreting what the cartoon is depicting. Refer to the cartoon on page 8 of the Annexure of the November 2020 NSC question paper. The cartoon is clearly showing the urban issue of traffic congestion. A number of candidates referred to other urban issues like overcrowding (many people in an area) and lack of planning (informal settlements) which was not clearly evident on the cartoon and could not be accepted.

Learners must look carefully at what is actually being shown in the cartoon to ensure they obtain maximum marks in the examination. In the case of the cartoon asked in this examination, the focus was on many cars stuck in the middle of an intersection. People were becoming frustrated as they could not move due to the resultant traffic congestion. There is a possibility that the robots were not working which could have resulted in this situation. One can't then relate the traffic congestion to overpopulation and discuss that as the urban issue as there is no evidence in the cartoon.

- (b) Cattle farming, which was the topic examined in Q3.5 (15 marks), had both a text and a photograph of the type of cattle to assist the candidates. This is one of the rotating topics that changes every year. Although cattle farming is mentioned in both the CAPS document and the 2017 Examination Guidelines, there was not much direction with regards to the depth of the study. In the 2021 Examination Guidelines more guidance is provided to assist teachers. In Q3.5.4 (8 marks) candidates had to link cattle farming with increased food security. Once again both these topics are not difficult when asked in isolation but become more of a higher order question when linked together. Teachers must not teach pockets of information independently but rather teach the relationship between them which is how the questions will be asked in the examination. An increase in beef production will have a positive impact on food security as more beef will be accessible and affordable. This will lead to more job opportunities as various other companies can also make use of the beef to produce other products such as biltong. As the home market increases there is less reliance on imports and more money is generated in the country.
- (c) Two core industrial regions are selected for study each year. They are clearly stipulated in the *Examination Guidelines* and are well documented in textbooks and study notes available. Teachers do, however, need to teach these sections well and not rely on the fact that learners will be given an infographic where they can obtain a lot of information to answer the questions. It could be that the two core industrial areas listed for study each year, are compared with each other or that the core industrial region is integrated with the SDI or IDZ selected for a particular year. The 2021 *Examination Guidelines* will provide the necessary information to teachers in this regard. Part (b) of Q3.6.4 (2 marks) asked how the PWV (Gauteng) industrial region overcame its water supply issue. Candidates do not need to have a full understanding of water transfer schemes as that is not in the Grade 12 *CAPS*, but they must know that water is transferred from places where there is sufficient to where there is not enough. Imposing water restrictions, higher tariffs and recycling of water are well within a Grade 12 Geographer's capability.

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

Common errors and misconceptions

- (a) In Q4.3 (15 marks) candidates did not fully understand the concept of *urban sprawl* and struggled to interpret the before and after image of the hand indicating the concept. They also were not able to discuss the unfavourable environmental conditions caused by urban sprawl in Q 4.3.4 (8 marks). The average for this question was 27% which was the lowest mark achieved for any question in the examination paper.
- (b) Candidates struggled to identify the environmental justice issue of air pollution depicted in the photograph in Q4.4 (15 marks). Some candidates selected land pollution (litter) or informal settlements instead. Candidates who selected the incorrect environmental justice issue could have lost most of the allocated 15 marks as the questions followed on from each other.
- (c) In Q4.5 (15 marks) candidates had to answer questions on the Saldanha Bay IDZ using the map and text provided as well as their own knowledge. This question was poorly answered, and it was evident that some candidates were not well prepared for this section. There is unfortunately not much information in any of the textbooks on the SDIs and IDZs. Candidates could not unpack the term *transport infrastructure* in Q4.5.4 (4 marks).

(d) It was very surprising to note that Q4.6 (15 marks) on the informal sector was not well answered by candidates. This topic is often tested, and candidates are known to do well in this question. The paragraph question in Q4.6.5 (8 marks) was poorly answered by many candidates. Candidates were asked to discuss the positive impact of the informal sector on the economy which was a slightly different angle as to what is normally asked. The word *impact*, although, often used in questions remains a challenge for candidates.

Suggestions for improvement

(a) Urban sprawl (Q4.3) can be defined as the uncontrolled formless expansion of an urban area. Some of the characteristics of urban sprawl are as follows: low-density single-family dwellings, dependency on transport, spiralling outward growth from urban centres, leapfrogging patterns of development (parcels of development), ribbon development along road routes leading out from urban areas and no defined rural-urban fringe. This type of development happens quickly with the influx of people into urban areas. It is therefore difficult to control such development. Use of diagrams like that on page 10 in the Annexure of the NSC 2020 November question paper assists in illustrating some of the above-mentioned characteristics of urban sprawl. The development is initially along the fingers of the hand in the before diagram. In the after-diagram development between the fingers depicts the process of urban sprawl.

Q4.3.4 (8 marks) focused on how *urban sprawl* has created unfavourable environmental conditions. Once again, learners had to link two concepts together (*urban sprawl* and *environmental injustice*) which increased the cognitive demand of the question. An increase of people, houses, cars and factories will increase air pollution, land pollution and noise pollution which in turn destroys the natural biodiversity of the area, reduces the aesthetic beauty and destroys habitats for plants and animals.

- (b) Q4.4 (15 marks) tested the environmental justice issue of air pollution using a photograph as a stimulus. There is a very good possibility that there will be a question on a justice issue in the examination paper. These issues can be environmental, economic or social justice issues. Teachers should aim to keep up-to-date case studies of these issues and have class discussions about them. This approach would create a better understanding of how they impact negatively on people or the environment as well as to develop sustainable strategies to overcome these issues. Teachers should note that one never just refers to pollution but rather it is always qualified by describing the type of pollution: air pollution, land pollution or noise pollution.
- (c) The topic in Q4.5 (15 marks) was the Saldanha Bay Industrial Development Zone. Industrial Development Zones (IDZs) are purpose-built industrial estates, linked to an international port or airport, which have been specifically designated for new investment by export-oriented industries and related services.

When teaching the prescribed IDZs teachers will have to do some of their own research or get learners to find out some interesting facts about the specific IDZ being studied. This could be a great learning experience for all. Irrespective of which IDZ is studied, the basic factors should be discussed and applied to the specific IDZ.

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, including road and rail routes and harbours which are essential for any industrial development to take place and was referred to in Q4.5.4 (4 marks).

(d) Q4.6 (15 marks) was based on the informal sector. This is an often-tested topic and one where learners normally score well as many base their Research project on this topic. Teachers must ensure that discussions about topics like the informal sector are conducted in class and that the word 'impact' is used in context. This will help learners to know how to respond whenever they see the word 'impact' in a question. They must know what the action word requires of them. Again, the importance of spending time explaining what each action word means and how the learner needs to respond in order to gain maximum marks for a question is reiterated.

6.5 OVERVIEW OF LEARNER PERFORMANCE IN PAPER 2

General comments

Areas of concern that were raised in the 2019 Diagnostic Report remain pertinent in the context of the 2020 NSC paper. They are emphasised here once again.

- (a) It is pleasing to note that there was a significant improvement in Q3 (Application and Interpretation) and Q4 (Geographical Information Systems). More candidates were able to correctly apply their theoretical knowledge to the maps. They showed a better understanding of GIS concepts.
- (b) A significant drop in the performance in Q2 is a major area of concern. Map calculations, techniques and their application remain a serious challenge. Working out the different steps of the calculation was problematic. Candidates seemed to lack knowledge regarding the purpose of these calculations and techniques. This limited their ability to answer these questions.
- (c) There were sufficient questions with a good level of predictability and a low level of difficulty to give all candidates a fair chance to pass. The apparent lack of preparation in some centres in provinces had a huge negative impact on candidates' performances. There was a clear difference in performance between centres. Some performed exceptionally well whilst in other centres almost all candidates did not pass.
- (d) Regarding map application, a significant number of candidates gave general answers whereas the questions required specific answers giving evidence from the topographic and orthophoto maps.
- (e) Orientation of the orthophoto map to the topographic map remains a challenge for many candidates. Questions which required candidates to identify features on the orthophoto map challenged candidates as they had to make use of both the topographic and orthophoto map to answer these questions.
- (f) A thorough analysis of the sources and the important information indicated on them was not carried out by a significant number of candidates. Candidates did not use the reading time allocated for this purpose. The information on the topographic and orthophoto map such as references and index to sheets is there to assist the candidates in answering various questions.
- (g) The requirements associated with certain action words were not clearly understood, and many candidates did not know how to approach these questions or understand what was expected of them. This resulted in candidates losing many marks in the middle- to higher-order questions. It must be noted that 75% of the marks came from these questions.

(h) Difficulties were experienced in differentiating between when to use the orthophoto map and when to use the topographic map e.g. the incorrect map scale was used in calculations.

General suggestions for improvement

- (a) Learners need to be constantly reminded that this is a mapwork paper and questions are set with the aim of deriving most answers from the maps provided. Regular revision using past papers from 2014 to 2020 will assist candidates to master this skill.
- (b) Learners need to understand the importance of integrating their theory knowledge with the mapwork. Although most of this integration is in Q3, it must be noted that it can be found in other questions. The frequent use of topographic and orthophoto maps as teaching aids in theory lessons will assist learners. Mapwork skills and interpretation exercises should be regularly practiced in all types of questions e.g. multiple choice, map calculations, application and interpretation and GIS.
- (c) In some questions, learners need to make use of the information found on the side of the topographic map e.g. the index to sheets, references and mean magnetic declination. Using past papers can be very effective in emphasising the importance of this information.
- (d) Regarding map orientation, learners can look for an easily identifiable feature on both maps e.g. a river as indicated below. Roads, railway lines, larger features and the shape of built-up areas are some of the other ways to do map orientation. By using the area highlighted, indicated by a red and black block on the topographic map, a learner can determine the location of the orthophoto map on the topographic map.



[Source: USGS. 'Keating Quadrangle, Pennsylvania]

- (e) Difficulties were experienced in differentiating between the use of the orthophoto and topographic maps e.g. the incorrect scale was used in calculations. Candidates must read through the entire question as there is always a reference to guide them as to which map to use.
- (f) Learners need to be made aware that there are distractors in the options given in the multiple-choice questions. They must be taught to recognise subtle differences in the options given. The questions in some instances have important descriptive words which can lead learners to the correct answer e.g. *main* activity (Q1.13; 1 mark). Learners must consider all four options before they make their choice. Teachers are advised to update their methods in setting compliant multiple-choice questions which can include lower-order, middle- and higher-order cognitive skills of testing. Learners should be made aware of the principles underlying multiple-choice questions.

- (g) Regarding calculations, learners must be exposed to and practice the stipulated steps and the marks allocated to them. Calculations should be marked by teachers as directed in the NSC marking guidelines and the *Examination Guidelines*. The purpose of the map calculations and techniques needs to be emphasised to the learners, e.g. the average gradient calculation determines the steepness of the area.
- (h) Mapwork needs to be integrated into the teaching of the theory component of Geography e.g. when teaching drainage patterns, these patterns can be identified on topographic maps. It must be noted that the theoretical aspects of Geography can be tested in all questions in the mapwork paper. Past papers are an important tool in this regard.
- (i) Educators need to emphasise the difference in the orthophoto map and topographic map information. e.g. scale (as indicated below) and index to sheets. This will assist candidates in selecting the correct information e.g. selecting the correct scale when calculating average gradient.

- (j) Teachers need to emphasise the significance and purpose of the GIS concepts taught and how to apply them to answer Q4.2.2 (2 marks) e.g. linking data layers with the choice of location of a feature like a graveyard.
- (k) Learners need to be able to understand Geographical terminology to improve performance. Understanding concepts like environmental, economic and social justice issues, physical (natural) vs human-made impacts is vital. This will avoid learners losing a significant number of marks. Selective reading, where learners focus on the word 'injustice' and not 'environmental injustice' like in Q3.5.2 (2 marks), can be avoided if candidates are taught to highlight or underline important words in the guestions.
- (I) Using a variety of maps which reflect the different regions of South Africa e.g. inland or coastal regions and from different provinces is very important. This will prepare candidates in answering questions on whatever map they receive in the NSC examination. A variety of maps are available to teachers and candidates from past NSC examinations.

6.6 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 6.6.1 Average performance per question in Paper 2

Q	Topic/s
1	Multiple-choice
2	Map Calculations and Techniques
3	Application and Interpretation
4	Geographical Information Systems



Graph 6.6.2 Average performance per sub-question in Paper 2

Sub-question	Торіс
1.1	Location
1.2	Contour interval
1.3	Map index
1.4	Grid reference
1.5	Distance
1.6	Direction of streamflow
1.7	Climate
1.8	Valley climate
1.9	Landforms
1.10	Land-use
1.11	Physical expansion
1.12	Classification of towns
1.13	Economic activities
1.14	Identification of human-made features
1.15	Vertical aerial photographs
2.1	Magnetic bearing
2.2	Average gradient
2.3	Cross-section, intervisibility and vertical exaggeration
3.1	Temperature change
3.2	Drainage pattern and stream order
3.3	Stages of a river
3.4	Street plans (patterns)
3.5	Mining
4.1	Components of GIS
4.2	Site of feature and data layers
4.3	Vector data

6.7 ANALYSIS OF LEARNER PERFORMANCE IN EACH QUESTION IN PAPER 2

QUESTION 1: MULTIPLE-CHOICE QUESTIONS

Common errors and misconceptions

- (a) Candidates in Q1.3 (1 mark) did not use the index to sheet on the maps. Many just guessed the answer.
- (b) In Q1.4 (1 mark) a significant number of candidates seemed to experience challenges in differentiating between lines of latitude and longitude on the map and in determining the correct degrees, minutes and seconds.
- (c) A significant number of candidates in Q1.5 (1 mark) could calculate the actual map distance but did not add the additional 0.5 km indicated on the side of the map to get to Rustenburg.
- (d) In Q1.6 (1 mark) candidates struggled to determine the direction of flow of the river using evidence from the topographic map.
- (e) Many candidates interpreted Q1.11 (1 mark) incorrectly and gave any option that was evident on the map. The question focused on the main factor that mostly limited physical expansion.
- (f) In Q1.13 (1 mark) candidates once again did not read the question where it asked for the main activity and as a result selected any sector.
- (g) Candidates experienced difficulties in Q1.15 (1 mark) in using shadows to determine the time the vertical aerial photograph was taken.

Suggestions for improvement

- (a) When answering questions on map index, such as Q1.3 (1 mark), learners need to use the index to sheets found on the border of the topographic map. Learners need to identify a particular map by number in relation to the map being examined.
- (b) Learners need to know the correct method to calculate grid reference in degrees, minutes and seconds as is indicated below.



[Source: YouTube - Geography with Dave]

- (c) Teachers should encourage learners to look at the important information indicated on the side of the mapped area. In Q1.5 the distance to Rustenburg was a further 0.5 km outside the mapped area.
- (d) Contour height readings, spot heights, trigonometrical stations and the use of dam walls are all common ways of determining the direction of flow of a river. In Q1.5 (1 mark) the dam wall is on the north-easterly side of the dam indicating that the river is flowing in a north-easterly direction. The water from the dam must flow out from the dam wall.
- (e) Learners should focus on the important key words like 'mostly' and 'main'. With regard to the expansion of Rustenburg (Q1.11; 1 mark), the various options were indicated on the topographic map but the option that mostly limited physical expansion was the mountain range. Similarly, for Q1.13 (1 mark) the main activity was tertiary.
- (f) In order to determine the time that a vertical aerial photograph was taken one needs to look at the direction in which the shadows are positioned. If the shadows are to the west/south-west, the photograph was taken in the morning (10:00 to 12:00). If the shadows are to the east/south-east, the photograph was taken in the afternoon (12:00 to 14:00). Shadows are shortest if the vertical aerial photograph was taken closer to 12:00. In the aerial photograph below the shadows are on the west/south-west indicating that it was taken in the morning.



[Source: https://pdfs.semanticscholar.org/0306/b969b9b46666c90776857d14966e5f7b6c401.pdf]

QUESTION 2: MAP CALCULATIONS AND TECHNIQUES

Common errors and misconceptions

- (a) With regard to Q2.1.1 (2 marks) candidates continued to experience difficulties in working out the true bearing especially when it is more than 180°.
- (b) Candidates' performances were negatively impacted in Q2.2.1 (5 marks) due to using the incorrect scale, i.e. scale of topographic map (1: 50 000) instead of the orthophoto map (1: 10 000), and not showing all steps of the calculations correctly.
- (c) In Q2.2.2 (2 marks) and Q2.2.3 (3 marks), many candidates could not apply the calculation of average gradient to give the values for X and Y. This is as a result of not understanding the purpose of calculating average gradient.

- (d) Candidates still had difficulty constructing a rough cross-section between two features on a topographic map as asked for in Q2.3.1 (3 marks).
- (e) Determining intervisibility, which was tested in Q2.3.2 (3 marks), was not fully understood by many candidates.
- (f) The conversion of the vertical scale to a ratio scale, Q2.3.3 (4 marks) created challenges for candidates.

Suggestions for improvement

- (a) To measure true bearing in Q1.1, it is preferable to use a full circle protractor. If using a semi-circular protractor, learners must note the 0° must be on the true north line. Regular practice of taking bearing readings is vital to ensure accuracy.
- (b) Constructing cross-sections such as in Q2.3.1 (3 marks) continues to be a challenge for many learners. Teachers can use the step-by-step method explained below to assist their learners.

Question: Construct a cross-section from A to B and indicate the position of the river on your cross section.

Step 1: Draw a pencil line connecting A to B. Check what the line from A to B is cutting through on the map. This will give you an idea of what the cross-section will look like e.g. if it cuts through a river the cross- section could have a valley shape.

Step 2: Place a piece of paper along the line A to B. Mark off the points where the line cuts the contour line and required features (river). Indicate the heights of the contour lines and the river in this example.



Step 3: Place the piece of paper on a horizontal axis and mark off the points from A to B in the exact position as they were recorded. Draw vertical lines from the points marked off on the horizontal axis. Draw horizontal lines from the contour height readings found on the vertical axis.

Geography

Step 4: Mark off each point by correctly matching the readings on both the vertical and horizontal axis.



Step 5: Join the points with a curved line.



Step 6: Indicate the required the feature (river) on the cross-section.

[Source: YouTube, 2020, https://youtu.be/7DvCoY43qsM]

(c) When determining intervisibility learners need to draw a sight line between the two points in question. This will provide a clear indication as to whether the points are visible.





No intervisibility (Not visible)

intervisibility (visible)

- (d) Showing the correct steps in map calculations and the application of map calculations and techniques remains a challenge. As indicated in past diagnostic reports, teachers and learners need to refer to past papers, marking guidelines and diagnostic reports. These resources provide a clear indication of the methodology and how marks are awarded for each calculation. Learners must ensure that the correct scale is used.
- (e) With regard to a ratio scale as in Q2.3.3 (4 marks), the unit on both sides of the ratio symbol must be the same. In this case, it would be incorrect to state 1 cm represents 20 m but correct to reflect this as 1 cm : 2 000 cm (1 : 2 000).

QUESTION 3: APPLICATION AND INTERPRETATION

Common errors and misconceptions

- (a) In Q3.1.1 (1 mark) some candidates experienced difficulties interpreting the graph which represented temperature. They did not focus on what the vertical axis represented and looked at Q as being at a higher altitude. This impacted negatively on their responses to Q3.1.2 (2 marks) as the questions were linked.
- (b) With regard to Q3.2.2 (1 mark), candidates could not differentiate between rock type and the underlying rock structure. In this instance candidates had to make use of their theoretical knowledge to answer this question.
- (c) Candidates experienced difficulties in Q3.2.3 (2 marks) in applying their theoretical knowledge of determining stream order to the topographic map.
- (d) In Q3.4.1 (2 marks) candidates found it difficult to discern between the type of street plan and the characteristics of the street plan.
- (e) In Q3.4.2 (2 marks), candidates did not focus on the key word, 'advantages', and gave general points or disadvantages. This shows that many candidates rote-learned without understanding and were therefore unable to apply the knowledge.
- (f) In Q3.4.3 (2 marks) the incorrect use of terminology resulted in candidates losing marks e.g. they wrote about a mountainous region instead of a steep slope/gradient.
- (g) Candidates did not interpret Q3.5.2 (2 marks) correctly. Instead of explaining how the mines caused the environmental injustice, they simply stated the injustice.

Suggestions for improvement

- (a) Learners should be encouraged to always read headings of the axis of any graph before attempting to answer the questions. In Q3.1 some candidates assumed that Q was at a higher altitude than P. The reason for this was that they only focused on the line graph. If a proper analysis of the graph was done, they would have seen that the vertical axis referred to temperature increase.
- (b) The difference between rock type and underlying rock structure needs to be emphasised to candidates (Q3.2.2). The following table illustrates the differences.

Drainage pattern	Rock type	Underlying rock structure		
Dendritic	Sedimentary, igneous	Uniform rock structure		
Trellis Sedimentary, igneous Folde		Folded or faulted rock, alternate layers of hard and soft rock		
Rectangular	Igneous	Jointed igneous		
Radial	Igneous	Dome, basin		

(c) Stream order needs to be taught with the aid of a topographic map as illustrated in Q3.2.3. When two 1st order streams meet, they form a 2nd order stream. When two 2nd order streams meet, they form a 3rd order stream. This is well illustrated below by the example tested in this past examination.



- (d) Teachers and learners need to note that there are only three street patterns/plans: grid iron, radial and irregular. Planned and unplanned describe the irregular pattern/plan.
- (e) Action words, like 'explain' and 'discuss', seem to be a challenge in every examination. A list of these words and their requirements are available in the *Examination Guidelines* and past diagnostic reports. Teachers should not only give this list to their learners but also explain how to use the words to answer questions. Q3.5.2 (2 marks) and Q3.5.3 (4 marks) could be used as examples.

QUESTION 4: GEOGRAPHICAL INFORMATION SYSTEMS (GIS)

Common errors and misconceptions

The poor performance of candidates in Q4.2.2 (2 marks) is related to the candidates' lack of understanding of the concept *data layer* as they gave examples of data layers instead of stating the data layer. Some candidates also could not relate the data layer to how it would assist in determining the site of the cemetery, which was a requirement of the question. The poor performance in Q4.3.2 (2 marks) was a result of this question being linked to Q4.2.2 (2 marks).

In Q4.3.2 (1 mark) candidates did not interpret the question properly and gave general line features which is not what the question required. Candidates responded with road instead of a river. The question actually asked for a natural line feature.

In part (a) of Q4.3.3 (2 marks) the question specifically tested the identification of a map reference symbol that focused on the extraction of ground water. Many candidates gave general factors such as 'reservoir' instead of the correct feature of a wind pump. Many candidates did not make use of the reference part of the topographic map to assist them

Suggestions for improvement

- (a) Learners need to know the difference between a data layer and an example of a data layer as illustrated in Q4.2.2 (2 marks). Drainage is a data layer and perennial river is an example of this data layer. Data layers are often tested in the GIS section of the mapwork paper. Teachers can illustrate the difference between data layers and examples of data layers by using the topographic map. Learners know the difference between and be able to identify both natural and human-made features in mapwork as asked in Q4.3.2 (1 mark). Roads are an example of a human-made feature and rivers are a natural feature. Another term for the natural environment is the physical environment.
- (b) The topographic map reference needs to be worked through by teachers when teaching mapwork skills. Learners must not only be able to identify the symbol on the topographic map but must also be able to describe and explain its purpose, e.g. a windpump is a type of windmill which is used for pumping underground water.

CHAPTER 7

HISTORY

The following report should be read in conjunction with the History question papers of the November 2020 NSC examination.

7.1 **PERFORMANCE TRENDS (2016–2020)**

The number of candidates who wrote the History examination in 2020 increased by 8 769 in comparison to the number in 2019. The performance of candidates continues to reflect an upward trend. This year there was an improvement from 90,0% in 2019 to 92,1% of the candidates achieving at the 30% level, with 77,6% achieving at the 40% level in comparison to the 74,0% in 2019.

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
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
2020	173 498	159 737	92,1	134 610	77,6

Table 7.1.1 Overall achievement rates in History

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 middle- and 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 userfriendly manner and this must be underpinned by the requisite historical skills to ensure a further improvement in the overall pass rate. History



Graph 7.1.1 Overall achievement rates in History (percentage)

Graph 7.1.2 Performance distribution curves in History (percentage)



7.2 OVERVIEW OF CANDIDATES' PERFORMANCE IN PAPER 1

- (a) Generally, candidates' performance in this question paper ranged from fair to very good. It was evident that some candidates opted for two essay questions and one source-based question. The popular choice questions were Q1, Q3, Q4 and Q6. Few candidates attempted Q2 and Q5.
- (b) In Section A: Source-based questions, many candidates found it challenging to define or explain concepts. They were unable to effectively interpret statements from the sources. It was also evident that many candidates lacked the ability to 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. Comparison of information between sources also proved to be challenging.
- (c) A large number of candidates relied mostly on the relevant information in the sources with little or no reference to their own knowledge. They were unable to effectively write a well-structured paragraph.
- (d) In Section B: Essay questions, several candidates demonstrated an understanding of the content knowledge but could not construct 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.



Figure 7.3.1	Average performance	per question in Pape	er 1
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Q	Topic/s
1	The Cold War: Containment and Brinkmanship: The Cuban Missile Crisis
2	Independent Africa: Case Study – Angola
3	Civil Society Protests from the 1950s to the 1970s: The Black Power Movement
4	Case Study – China
5	Independent Africa: Comparative Case Study – The Congo and Tanzania
6	Civil Society Protests from the 1950s to the 1970s: The Civil Rights Movement

History



Figure 7.3.2 Average performance per sub-question in Paper 1

0	Skills	0	Skills	0	Skills	0	Skille
<u>a</u>	hassassa	<u>u</u>	hassasse	<u>u</u>	hassasse		hassassa
11	1 1 1 Extraction	21	2.1.1 Extraction	21	3.1.1 Extraction	4	Eccov
1.1	1.1.1 LAtraction	2.1	2.1.1 Extraction	3.1	2.1.2 Extraction	4	Losay
	1.1.3 Interpretation		2.1.3 Interpretation		3.1.3 Interpretation		
	1.1.4 Extraction				3.1.4 Interpretation		
1.2	1.2.1 Extraction	2.2	2.2.1 Extraction	3.2	3.2.1 Interpretation	5	Essay
	1.2.2 Interpretation		2.2.2 Extraction		3.2.2 Usefulness		
	1.2.3 Interpretation		2.2.3 Extraction				
			2.2.4 Interpretation				
1.3	1.3.1 Extraction	2.3	2.3.1 Extraction	3.3	Comparison	6	Essay
	1.3.2 Interpretation		2.3.2 Hist Concept				-
	1.3.3 Extraction		2.3.3 Interpretation	on			
	1.3.4 Usefulness		2.3.4 Interpretation				
1.4	1.4.1 Interpretation	2.4	2.4.1 Interpretation	3.4	3.4.1 Extraction		
	1.4.2 Interpretation		2.4.2 Usefulness		3.4.2 Interpretation		
					3.4.3 Interpretation		
1.5	Comparison	2.5	Comparison	3.5	3.5.1 Extraction		
				3.5.2 Hist Concept			
					3.5.3 Interpretation		
1.6	Paragraph	2.6	Paragraph	3.6	Paragraph		

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

Common errors and misconceptions

- (a) In Q1.1.1 many candidates could not define the term *communism* in their own words. They provided generalised responses such as 'everything belongs to the state'.
- (b) A large number of candidates were unable to explain the implication of the statement 'Khrushchev and the Soviets could not have asked for a better-located ally against the United States of America' in Q1.1.3. They simply extracted the information provided in the source.
- (c) In Q1.3.4 several candidates struggled to ascertain the limitations of Source 1C to a historian researching the Cuban Missile Crisis. They merely explained the usefulness of the source.
- (d) Some candidates lacked the ability to explain why 'the article was published on the front cover of *The Arizona Republic*' in Q1.4.1. They made general statements without providing relevant explanations.

QUESTION 2: INDEPENDENT AFRICA: CASE STUDY – ANGOLA

Common errors and misconceptions

- (a) In Q2.2.4 a large number of candidates could not interpret the statement 'Crocker's long fight was over, his goal of brokering a regional peace deal was realised at last'. They lacked basic interpretation skills.
- (b) Some candidates struggled to extract relevant information from Source 2C that was closely linked to the peace and security of the south-western region of Africa (Q2.3.1). They offered incomplete responses such as 'independence' which did not answer the question.
- (c) In Q2.3.4 many candidates found it difficult to comment on the role that the United Nations Organisation played during the peace negotiations in Angola. This was mainly due to their lack of knowledge about the United Nations Organisation.
- (d) The majority of candidates had difficulty to compare the information in Sources 2C and 2D regarding Cuba's role in the Angolan Civil War in Q2.5. Many of them could not link the information in the visual source to that of the written source.
- (e) In Q2.6 some candidates struggled to use the information in the relevant sources and their own knowledge, to write a coherent paragraph explaining 'the impact that the Battle of Cuito Cuanavale had on South Africa and Cuba'.

QUESTION 3: CIVIL SOCIETY PROTESTS FROM THE 1950s TO THE 1970s: THE BLACK POWER MOVEMENT

This proved to be a popular question as it was attempted by a large number of candidates. The performance ranged from fair to good.

Common errors and misconceptions

- (a) In Q3.1.3 several candidates were not able to clearly explain the statement 'a reform programme is set up by the existing exploitative system an appeasing hand-out, to fool the people and to keep them quiet'. Most candidates lacked knowledge and understanding of the question.
- (b) It was evident in Q3.2.1 that some candidates were unable to explain the messages that were conveyed in the photograph. Many candidates responded by rewriting the message from the source without explaining it.
- (C) A large number of candidates struggled to define the concept *black nationalism*, using their own words, in Q3.5.2. It was clear that they confused the term *black nationalism* with *black power*.

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 able to take a stance for the statement that 'Chairman Mao Zedong introduced the Third Five-Year Plan (Cultural Revolution) to address the challenges that ordinary Chinese experienced during the implementation of the Second Five-Year Plan (Great Leap Forward)'.
- (b) It was also noted that essays of weaker candidates lacked proper introductions and contained irrelevant background information. In addition, many could not sustain their line of argument or 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) A large percentage of candidates were unable to critically discuss the social and economic policies that Mobutu Sese Seko (the Congo) and Julius Nyerere (Tanzania) implemented in their respective countries after attaining independence in the 1960s'. The content presented, was largely descriptive and there was little attempt to develop a line of argument.
- (b) Several candidates showed a lack of content knowledge and proceeded to discuss the political problems. They wrote narrative essays focusing on Congo and subsequently on Tanzania, with no direct comparison being made.

QUESTION 6: CIVIL SOCIETY PROTESTS FROM THE 1950s TO THE 1970s –THE CIVIL RIGHTS MOVEMENT

Common errors and misconceptions

- (a) Many candidates were able to explain 'to what extent the various forms of protests by the Civil Rights Movement led to an improvement in the lives of ordinary African Americans in the United States of America 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 DIAGNOSTIC QUESTION ANALYSIS FOR PAPER 2

The following graph is based on data that was gathered from a random sample of candidates' scripts. While this graph might not accurately reflect the national averages, it serves as a useful tool in analysing how candidates performed in specific choice questions.



Figure 7.5.1	Average	performance	per c	uestion	in Pa	per 2
	/	p • · · • • · · · · · · · · • • •		14004.01		P 0

Q	Topic/s
1	Civil Resistance, 1970s to 1980s: South Africa
2	The coming of democracy to South Africa and coming to terms with the past
3	The end of the Cold War and a New World Order, 1989 to the present
4	Civil Resistance, 1970s to 1980s: South Africa: The crisis of apartheid in the 1980s
5	The coming of democracy to South Africa and coming to terms with the past
6	The end of the Cold War and a New World Order: The events of 1989



Figure 7.5.2 Average performance per sub-question in Paper 2

Q	Skills	Q	Skills	Q	Skills	Q	Skills
	assessed		assessed		assessed		assessed
1.1	1.1.1 Extraction	2.1	2.1.1 Extraction	3.1	3.1.1 Hist Concept	4.	Essay
	1.1.2 Hist Concept		2.1.2 Interpretation		3.1.2 Extraction		
	1.1.3 Extraction		2.1.3 Hist Concept		3.1.3 Extraction		
	1.1.4 Interpretation		2.1.4 Extraction		3.1.4 Interpretation		
1.2	1.2.1 Interpretation	2.2	2.2.1 Interpretation	3.2	3.2.1 Extraction	5.	Essay
	1.2.2 Extraction		2.2.2 Extraction		3.2.2 Interpretation		
	1.2.3 Usefulness		2.2.3 Interpretation		3.2.3 Interpretation		
1.3	1.3.1 Interpretation	2.3	2.3.1 Extraction	3.3	3.3.1 Extraction	6.	Essay
	1.3.2 Interpretation		2.3.2 Interpretation		3.3.2 Extraction		
			2.3.3 Usefulness		3.3.3 Interpretation		
					3.3.4 Usefulness		
1.4	1.4.1 Interpretation	2.4	2.4.1 Extraction	3.4	3.4.1 Interpretation		
	1.4.2 Extraction		2.4.2 Extraction		3.4.2 Interpretation		
	1.4.3 Extraction		2.4.3 Interpretation				
	1.4.4 Interpretation						
1.5	Comparison	2.5	Comparison	3.5	Comparison		
1.6	Paragraph	2.6	Paragraph	3.6	Paragraph		

7.6 ANALYSIS OF LEARNER PERFORMANCE IN EACH QUESTION IN PAPER 2

SECTION A: SOURCE BASED QUESTIONS

QUESTION 1: CIVIL RESISTANCE, 1970s TO 1980s: SOUTH AFRICA

Common errors and misconceptions

- (a) In Q1.1.4 a significant number of candidates could not use the information in the source together with their own knowledge to explain why the apartheid government introduced Afrikaans as a compulsory medium of instruction at black South African schools. Candidates gave irrelevant responses and showed a lack of content knowledge in this regard.
- (b) In Q1.4.1 the majority of candidates could not explain why there were differences in the official and unofficial figures regarding the number of students that were killed by the police in Soweto. They failed to interpret the question correctly and seemed not to understand the concepts of 'official' and 'unofficial figures'.
- (c) It was evident that a large number of candidates found it difficult to use the information in the source and their own knowledge to explain why the Soweto Uprising was regarded as a turning point in South Africa's history (Q1.4.4). It was clear that they lacked appropriate content knowledge on this topic.

QUESTION 2: THE COMING OF DEMOCRACY TO SOUTH AFRICA AND COMING TO TERMS WITH THE PAST

Common errors and misconceptions

- (a) In Q2.1.2 many candidates experienced problems in explaining why the TRC focused on restorative justice rather than retributive justice. They lacked knowledge of the concepts of 'restorative justice' and 'retributive justice', which is essential when the content of the TRC is addressed.
- (b) A large number of candidates were not able to define the term *amnesty* in the context of the TRC in Q2.1.3. Candidates provided vague and generalised responses such as 'amnesty means forgiveness' and did not score marks.
- (c) In Q2.4.3 a significant number of candidates struggled to explain why they think Goniwe's brother was pleased with the TRC's decision regarding the Cradock Four. They lacked basic content knowledge about 'amnesty' and therefore could not adequately answer the question.
- (d) It was evident in Q2.6 that most candidates were not very successful in using the information in the relevant sources and their own knowledge, to effectively write a coherent paragraph to explain how the TRC dealt with the murder of political activists such as the Cradock Four

QUESTION 3: THE END OF THE COLD WAR AND A NEW WORLD ORDER, 1989 TO THE PRESENT

Common errors and misconceptions

- (a) In Q 3.1.4 most of the candidates could not link the information in the sources with their own knowledge to appropriately comment on Thomas Friedman's claim 'that today globalization is 'farther' (and) 'faster'. They merely quoted irrelevant information from the source.
- (b) In Q3.2.3 a large number of candidates showed a lack of interpretative skills in trying to explain why the wages of 'low-skilled' workers have been reduced.
- (c) It was evident that some candidates found it difficult to explain the messages that were conveyed in the cartoon. They lacked the skill of using visual clues in their responses.
- (d) In Q3.5 candidates could not compare evidence presented in Sources 3C and 3D. They failed to explain how the information in these sources supported each other regarding the negative effects of globalisation on South Africa.

SECTION B: ESSAY QUESTIONS

QUESTION 4: CIVIL RESISTANCE, 1970s TO 1980s: SOUTH AFRICA – THE CRISIS OF APARTHEID IN THE 1980s

Common errors and misconceptions

- (a) Some candidates were unable to take a stance to indicate whether they agree or disagree with the statement that 'it was the result of intense pressure from various international anti-apartheid organisations that led to the eventual collapse of the apartheid regime in the 1980s'.
- (b) A few candidates did not write an introduction and gave a narrative account, which did not address the demands of the question.

QUESTION 5: THE COMING OF DEMOCRACY TO SOUTH AFRICA AND COMING TO TERMS WITH THE PAST

Common errors and misconceptions

- (a) A significant number of candidates struggled to critically discuss the process of negotiations among various political parties that played a significant role in the establishment of a democratic South Africa in 1994.
- (b) Candidates merely memorised responses from previous question papers or model essays and simply reproduced them without reading the question asked or the specific requirements of the question.

QUESTION 6: THE END OF THE COLD WAR AND A NEW WORLD ORDER - THE EVENTS OF 1989

Common errors and misconceptions

- (a) Many candidates could not explain 'to what extent the collapse of the Soviet Union in 1989 contributed to the political changes that occurred in South Africa'.
- (b) Candidates showed weaknesses in developing and sustaining a coherent line of argument. They simply offered narrative essays, and scored poorly.

7.7 SUGGESTIONS FOR IMPROVEMENT IN BOTH PAPER 1 AND PAPER 2

Teachers should:

- (a) Ensure that the prescribed content, as contained in the *CAPS*, *Abridged Section 4 of CAPS* and the *2021 Examination Guideline* document, is aligned to the Recovery Annual Teaching Plan (ATP) or any revisions to this plan, and is comprehensively covered within the time frames.
- (b) Expose learners to a variety of sources (e.g., visual, written, statistical, graphical 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 reliability 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 tested, and incorporate them in lessons.
- (c) Develop a list of concepts pertaining to each theme that must be covered and apply these concepts throughout the year as the topic is being addressed. This will assist learners in refining skills to answer interpretative questions.
- (d) Equip learners with the necessary skills related to the definition or explanation 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. It is strongly advised that all historical concepts applicable to a specific topic be thoroughly unpacked and explained at the beginning of each topic, while the content focus is gradually unlocked.
- (e) 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 concise and to the point by structuring short sentences to frame the paragraph.
- Start a paragraph with an opening statement that affirms or opposes the question and conclude the paragraph with a closing statement that supports the opening statement.
- Always make reference to the question when writing a paragraph.
- (f) Encourage learners to use the 5'W's in all historical inquiry, as listed in the table below:

Question to ask	Purpose
When?	To study historical periods
Where?	To learn where historical events took place
Who?	To gain knowledge about historical figures
What?	To equip learners with historical knowledge

After completing a topic or specific content focus, learners should be trained to acquire historical skills by asking them to apply the 5'W's to the content being taught.

- (g) Provide opportunities that expose learners to innovative, relevant and user-friendly resources as well as examination techniques.
- (h) Practise source-based, paragraph and essay writing skills by working with past NSC (*CAPS*) compliant question papers.
- (i) Set skills-focused tasks to assess specific cognitive levels, such as making comparisons between information in sources so that answers can be structured in the context of the question posed.
- (j) Develop the requisite essay-writing techniques by:
 - Coaching learners on how to unpack the question posed by identifying four key aspects namely, the action verb used (e g, explain to what extent, do you agree or critically discuss), content focus, context of the content focus and time frame.
 - 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 listed 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.
- (k) Guide learners to respond to an argumentative essay by focusing on a strong introduction (with a line of argument or an independent line of argument), paragraphs that sustain the line of argument taken at the introduction and a conclusion that ties up the line of argument and links well with the introduction.
- (I) Attend content and assessment workshops, subject meetings or subject briefing sessions to firstly, familiarise themselves with the requirements and demands of the *CAPS* and the *2021 Examination Guidelines* document and secondly, to use recent and relevant teaching and learning methods in classrooms.
- (m) Undertake the necessary research on the latest historical trends in the teaching and learning of history.
- (n) 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.
- (o) Instil the following steps when teaching learners how to compare evidence in two sources to answer questions on either similarities or differences:
 - Read the question thoroughly and underline the main point thereof.
 - Study the contextualisation of both sources and underline its main context.
 - Check the author and the purpose of each source, after studying the contextualisation of the source. This will give a clue about the perspective and intention of the source, which could then be compared against the other source.
 - Detect opposing viewpoints by identifying the rival organisations or ideologies that the two sources represent. If opposing viewpoints form part of the contextualisation of the two sources that are compared, learners must underline both viewpoints, because the different perspectives displayed by each source would already provide the learner with one option of the answer.
 - Familiarise themselves with the information in the sources mentioned. The 5 W's stated earlier can be used in this regard.
 - Establish and underline the relevant information in both sources that applies to the question posed.
 - Have a clear understanding of what a visual source entails (what it is about) by finding dates, numbers, historical figures, facial expressions, text or any other object relevant to the question.

- Provide the required responses for the question in either of the following ways:
 - In answering a question about similarities, learners could use the following: 'Both sources refer to ...' or 'Source 1A mentions ... and Source 1B shows ...'
 - When comparing information for differences or contrast, it is very crucial that learners state: 'Source 1A says... WHILE Source 1B states...' or 'In Source 1A we read... WHILE Source 1B shows ...' or Source 1A is written from a communist perspective (Russian point of view) WHILE Source 1B is written from a capitalist perspective (US point of view).
- Highlight the point that credit will be given for each response that makes reference to both sources, i.e., 2 (two) marks). To get full marks in a question with a mark allocation of (2 x 2 = 4), learners should provide TWO responses that refer to both sources, but on two different aspects.

Subject Advisors should:

- (a) Thoroughly study and understand the Diagnostic Report provided.
- (b) Plan, prepare and conduct intensive content and assessment workshops on problematic areas as contained in this report with FET History teachers.
- (c) 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 2020 Marking Guidelines.
- (d) Workshop educators on the findings of the NSC November 2020 Diagnostic Report.
- (e) Vigorously monitor and quality assure the assessment tasks administered by teachers.
- (f) Develop appropriate resource materials which both teachers and learners can interact with.
- (g) Workshop teachers on challenging topics identified in the NSC November 2020 examination.

Teacher development should:

- (a) Identify teacher needs and gaps as outlined in the Diagnostic Report.
- (b) Assist teachers on how to plan, prepare and present interactive History lessons.
- (c) Ensure that new teachers are supported and guided on pedagogy, content and teaching methodology.
- (d) Equip teachers with the latest teaching trends and techniques in History.
- (e) Prepare teachers to apply a principle of English Across the Curriculum (EAC) in their subject.
- (f) Train school Principals on the implementation of Quality Management Systems (QMS), that, amongst others, would include management of curriculum implementation.

CHAPTER 8

LIFE SCIENCES

The following report should be read in conjunction with the Life Sciences question papers of the November 2020 NSC examination.

8.1 **PERFORMANCE TRENDS (2016–2020)**

The number of candidates who wrote the Life Sciences examination in 2020 increased by 18 191 in comparison to that of 2019. The performance of the candidates in 2020 reflects a slight decline at the 30% level from 72,3% in 2019 to 71,0%, as well as at the 40% level from 49,0% in 2019 to 47,9%.

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
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
2020	319 228	226 700	71,0	153 028	47,9

Table 8.1.1 Overall achievement rates in Life Sciences

Over the years there has been an improvement in the drawing of graphs. There has also been a considerable improvement in the layout and application of genetic cross diagrams.

Another challenging area that has seen some improvement is the understanding and application of a dihybrid cross in genetics. The topic on evolution is the last item on the ATP and may therefore not enjoy the attention it deserves. This is evident in the lower performance in this topic, more especially human evolution.

The scientific investigation and the calculation activities still seem to challenge most candidates. This form of assessment is found in papers 1 and 2 and it would serve the learners well if they could master it. Scientific investigations and calculations are introduced in grade 10 and should be thoroughly reinforced before Grade 12. Training and teacher support on these concepts must be given from Grade 10.

With the implementation of the amended section 4 of the *CAPS* (NSC November 2021), there is a change in the weighting of topics across the two Life Sciences papers. The topics on Reproduction and Responding to the Environment in paper 1 both have a greater weighting than before. Therefore, teaching strategies should cater more time and resources towards these sections.

In paper 2, the topic on meiosis will be assessed for 21 marks. This topic was tested in both papers before, but exclusive assessment in paper 2 will allow for more in-depth testing. Teacher workshops should therefore focus strongly on the teaching of Reproduction, Human Response to the Environment, Genetics and Evolution.


Graph 8.1.1 Overall achievement rates in Life Sciences (percentage)

Graph 8.1.2 Performance distribution curves in Life Sciences (percentage)



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) Many candidates ignored the instruction to start each question on a new page.
- (c) Some candidates gave more answers than what were required. If only TWO answers were required, only the first two answers will be marked according to Marking Principle 2 of Life Sciences.
- (d) Poor performance is still being recorded in questions based on scientific investigations despite the support provided in the diagnostic reports of previous years.
- (e) There was also poor performance in the Endocrine System, Homeostasis and Plant Hormones.
- (f) The candidates' performance indicates that the work on Human Impact on the Environment, which was taught in Grade 11, was not properly revised or revisited in Grade 12.
- (g) Since textbooks do not always carry accurate information, teachers should always be guided by the *CAPS* and *Examination Guideline* 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.



Q	Topic/s
1	Multiple Choice, Terminology, Matching Items, Human Reproduction and Neurons
2	Brain and Sense Organs, Thyroxin and TSH and Plant hormones
3	Meiosis, Human Reproduction and Human Impact
4	Homeostasis and Human Impact

Graph 8.3.1 Average performance per question in Paper 1



Graph 8.3.2 Average performance per sub-question in Paper 1

Sub-question	Topic/s
1.1	Multiple-Choice Questions
1.2	Terminology
1.3	AB matching
1.4	Human Reproduction – Sperm and development of the zygote
1.5	Human Response to the Environment - Neurons
2.1	Human Response to the Environment - Brain and ear
2.2	Human Response to the Environment - Accommodation
2.3	Endocrine System - Thyroxin and TSH
2.4	Plant hormones - Scientific investigation (auxin)
3.1	Meiosis
3.2	Human reproduction - Female
3.3	Human reproduction - Scientific investigation (male fertility)
3.4	Human impact - Fertilisers and nitrogen pollution
4	Homeostasis - Temperature and carbon dioxide Human Impact - Importance of carbon dioxide and global warming

The worst performance by candidates was recorded in the sub-questions on Thyroxin and TSH, Plant Hormones (based on an investigation), Human Reproduction, Homeostasis and Human Impact.

8.4 ANALYSIS OF LEARNER PERFORMANCE IN EACH QUESTION IN PAPER 1

QUESTION 1: MULTIPLE-CHOICE, TERMINOLOGY, MATCHING ITEMS, HUMAN REPRODUCTION AND NEURONS

Common errors and misconceptions

- (a) In Q1.1 candidates performed in well except for Q1.1.7 where they could not apply their knowledge on the methods to control alien invasive plants.
- (b) In Q1.2 biological terms remain problematic for many candidates. In this regard candidates:
 - Gave the term *monosomy* in Q1.2.3 instead of *haploid* for a cell that only has one set of chromosomes. 'Monosomy' was not accepted as an answer since it refers to the absence of a chromosome, e.g., 45 chromosomes instead of 46.
 - Provided the term *tropism* in Q1.2.4 when the required term was *phototropism*; *umbilical cord* instead of *umbilical artery* in Q1.2.7 and could not differentiate between the *parasympathetic* and *sympathetic* nervous system in Q1.2.9.
 - Confused the term *corpus callosum* with *corpus luteum* in Q1.2.6 and *choroid* with *chorion* in Q1.2.10.
- (c) In Q1.3.3 many candidates did not know that internal fertilisation takes place in both altricial and precocial development.
- (d) Many candidates lost marks in Q1.4 due to a lack of knowledge of the structure of the sperm and the developing zygote, despite this being stipulated as a requirement in the *Examination Guideline*.
- (e) Marks were lost in Q1.5 due to candidates' inability to follow the instructions to give numbers of TWO neurons and not only one.

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) Learners should be encouraged to read questions with proper understanding.
- (c) Certain sections of work, especially those that involve structure and function (such as the reproductive system in Q1.4, the sperm and the development of the zygote and the neurons in Q1.5) are best taught using diagrams.

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.

(d) Teachers should use the information provided by the *Examination Guideline* and not teach unnecessary content (given by some textbooks).

QUESTION 2: BRAIN, SENSE ORGANS, THYROXIN AND TSH AND AUXINS

Common errors and misconceptions

- (a) Poor performance in Q2.1 was due to a lack of knowledge of basic terminology which was evident when candidates provided the answer:
 - *Cerebellum* instead of *cerebrum* in Q2.1.1(a)
 - Oval window instead of round window in Q2.1.2
 - Cochlea instead of Organ of Corti where the receptors are found in Q2.1.3
 - On pupillary mechanism instead of accommodation in Q2.2
- (b) In Q2.1.4 candidates mentioned the functions of the medulla oblongata instead of explaining the consequence of it being damaged.
- (c) Many candidates were unable to state the relationship between the cerebellum and the semi-circular canals in Q2.1.5. They described the whole process of balance, instead of how the cerebellum responds to the impulses. They also referred generally to effectors instead of specifically to skeletal muscles.
- (d) In Q2.1.6 candidates described the normal process of hearing, instead of explaining how the hardening of the oval window will lead to hearing loss in older people. Many candidates used the word 'message' instead of 'impulse'. They used the terminology sound waves, pressure waves, vibrations and impulses incorrectly in their descriptions.
- (e) Poor performance is Q2.3 can be attributed to the fact that candidates:
 - Lacked the skill to interpret and use the graph to do the calculation correctly.
 - Were unable to make the link that a high thyroxin concentration will increase the metabolic rate by using more glucose during cell respiration. Therefore, less glucose will be stored and fat will also be broken down to supply glucose, leading to weight loss.
 - Had insufficient scientific knowledge, e.g. instead of glucose that is used they just wrote that energy is used up. The concept that glucose is broken down during cell respiration to release energy (as ATP) in a cell, is not well understood.
 - Lacked the insight to explain the negative feedback between thyroxin and TSH when there is a high thyroxin concentration in the blood.
- (f) In Q2.4 interpreting the investigation from the diagrams provided challenges to many candidates who showed a lack of knowledge of the prescribed practical work.

Candidates were not familiar with what 'agar' is. They could not state in a *cause-effect* way why the apical bud was placed on the block of agar jelly.

They explained the effect of light on auxins or apical dominance instead of the functions of auxins in cell elongation.

(g) Candidates were still not able to differentiate between the action verbs *state*, *describe* and *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 Q2.1.5 and Q2.1.6, Q2.2, Q2.3.3 and Q2.4.1.

- (a) Teachers must use the correct biological terminology and not the common names, e.g. *impulse* instead of *message*. Learners should be taught to distinguish amongst vibrations, pressure waves, sound waves and impulses.
- (b) The section on disorders or defects, together with their corrective mechanisms related to the nervous system, must not be neglected by teachers.
- (c) Teachers should guide learners on how to answer questions based on predicting the effect of a part, such as the oval window when it fails to function. A successful answer depends in the first instance, on the learners' knowledge of the function of the structure. It is then easy to deduce what would happen if that function was not performed.
- (d) Teachers should use diagrams or a table like the one below to show learners the difference between accommodation and pupillary mechanism, to avoid confusion between the two concepts. The first step is to ensure that learners can name the parts of the eye that are responsible for each process whilst they also identify these structures in a diagram of the eye.

	Accommodation	Pupillary mechanism
Stimulus	 Change in distance of object from the eye 	- Change in light intensity
Parts involved	 Lens Suspensory ligaments Ciliary muscles 	 Pupil Radial muscles of iris Circular muscles of iris
Main change that must take place	- Shape of lens	- Diameter of pupil
What brings about the change above	 Suspensory ligaments Ciliary muscles 	 Radial muscles of iris Circular muscles of iris

- (e) The formula to calculate percentage increase must be taught in schools.
- (f) Teachers must expose learners to extracts like the one on thyrotoxicosis. This question had a high cognitive demand requiring an application of knowledge. Learners must be exposed to such questions and teachers must assist learners in reading with understanding.
- (g) Learners should know the functions of thyroxin and other hormones. Teachers should emphasise the effects of too much or too little of a hormone on the body, and allow learners to explain the effects.
- (h) The endocrine system must be taught with homeostasis to ensure that learners can understand the link between the feedback mechanisms of the different hormones.
- (i) Teachers must integrate scientific investigations into the teaching and learning process. Prescribed practical work in plant responses must be done. Previous examination papers are useful in exposing learners to the different types of investigations of this topic. Teachers must emphasise cause-effect relationships and teach learners the skill of formulating answers in a logical way.

QUESTION 3: MEIOSIS, HUMAN REPRODUCTION AND HUMAN IMPACT

Common errors and misconceptions

- (a) In Q3.1.2 some candidates were not able to correctly identify the phases of meiosis represented in the diagram. This is evident that they are not able to recognise the events of each phase. In some cases, for example, they identified the phase in diagram 2 as anaphase II rather than telophase II.
- (b) Most candidates could not answer Q3.1.7. They could not apply their knowledge to explain the structural differences between the replicated chromosomes (due to DNA replication) and unreplicated chromosomes (due to splitting during anaphase II).
- (c) The following common errors were observed in Q3.2:
 - Some candidates lost a mark in Q3.2.1 by not correctly identifying part D.
 - In Q3.2.3 candidates lost marks because they described ovulation instead of oogenesis. A description of oogenesis is provided in the *Examination Guideline*.
 - Many candidates could not state how the uterus is suited for its function in Q 3.2.4.
 - In Q3.2.5 many candidates could not explain in a cause-effect way why a person would not menstruate if the ovaries on both sides were removed.
- (d) Some candidates failed to identify the dependent variable in the investigation in Q3.3.2 and the way in which it was measured.
- (e) In Q3.4.2 many candidates could not explain why the farmer will not benefit economically by using more fertiliser than the recommended amount.
- (f) In Q3.4.4 many candidates did not read the question properly and as a result they missed the 'effect that an increase in nitrogen pollution' will have on 'the number of bacteria'. They answered the question as to what the effect would be on water quality ignoring the effect on bacteria. Most included oxygen in their answer. Oxygen was the secondary effect. They answered the question as it was asked in previous question papers. Because they did not answer the question correctly, they lost the compulsory mark.

- (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.
- (b) 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.
- (c) 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.

(d) Teachers should assist learners to differentiate amongst terminology e.g., replicated chromosome, unreplicated chromosome, chromatid and daughter chromosome as follows:

_	
Term	Description
Unreplicated	This refers to a chromosome as it appears before DNA replication
chromosome	takes place.
Replicated	This refers to a chromosome as it appears after DNA replication takes
chromosome	place.
	Because of DNA replication all chromosome material is doubled.
	Hence, each replicated chromosome is made up of two chromatids,
	joined by a centromere.
Chromatid	This refers to each of the two threads of a replicated chromosome.
Daughter	This refers to each chromatid after it splits from its sister chromatid
chromosome	during anaphase II and is moving towards the poles.

- (e) Teachers must place more emphasis on scientific investigations such as was assessed in Q3.3. They must teach learners how to identify variables using the aim of the investigation and not the results. Every formal assessment should assess Specific Aim 2, to familiarise learners with the scientific skills.
- (f) There seems to be confusion between the terms *leaching* and *eutrophication* as was evident in answers to Q3.4. Leaching is the process when fertilisers are washed off the land by rain-water into rivers and lakes. Eutrophication is the process whereby the fertilisers accumulate in a water body, encouraging algal bloom.

QUESTION 4: ESSAY ON THERMOREGULATION, CO_2 CONTROL AND CO_2 & GLOBAL WARMING

Common errors and misconceptions

- (a) In the essay in Q4, many candidates did not present their answers clearly under the following expected headings:
 - How the body maintains the temperature when it arises above normal limits
 - Maintaining the carbon dioxide level when it rises above normal levels
 - Importance of carbon dioxide to maintain atmospheric temperature and the effect of increased levels of carbon dioxide on global warming
- (b) Many candidates did not write the paragraphs in a cause-effect way to provide a logical flow of the processes.
- (c) For the account on 'how the body maintains the temperature when it arises above normal limits', candidates lost marks in the following ways:
 - Few candidates mentioned that the receptors are stimulated. Most candidates stated that the hypothalamus and medulla oblongata will detect the change.

- Many candidates used the word 'messages' instead of 'impulses' that were sent to the blood vessels in the skin causing it to dilate.
- Candidates lost marks for not stating that 'blood vessels in skin are stimulated', they just refer to 'blood vessels'.
- They did not write '**more** blood flows to the skin/sweat glands'. Candidates did not understand the 'more' concept. Sweat glands release sweat continuously but with a higher than normal temperature, more sweat will be lost.
- (d) For the account on 'maintaining the carbon dioxide level when it rises above normal levels' candidates lost marks in the following ways:
 - Many candidates mentioned the cardiovascular centre and respiratory centre but did not mention the medulla oblongata.
 - Candidates had the idea that an increase in temperature causes an increase in the level of carbon dioxide.
 - Some candidates discussed the action of adrenalin instead of carbon dioxide regulation.
- (e) For the account on 'importance of carbon dioxide to maintain atmospheric temperature and the effect of increased levels of carbon dioxide on global warming' candidates lost marks in the following ways:
 - Candidates did not know the functions of CO₂ and the fact that CO₂ is needed to keep the earth warm to make life on Earth possible.
 - They described CO₂ as causing global warming rather than the *increase* in CO₂ which increases the average global temperature that leads to global warming.
 - Candidates did not know the difference between the greenhouse effect and the enhanced greenhouse effect.
- (f) From the 3 marks awarded to the synthesis of the essay, candidates lost 1 mark for:
 - Relevance, when they gave answers for both a hot and a cold day or when they described the effect of ozone and deforestation on global warming.
 - Logical sequence, when they failed to present information in a logical fashion.
 - Comprehensiveness, when they answered only one aspect of the essay in detail or answer all three aspects but not in sufficient detail.

- (a) From 2021, according to the Amendments to Section 4 of *CAPS* for the Life Sciences, there will be no essay in the examination paper.
- (b) Learners do not understand the homeostatic control of temperature. The *Mind the Gap* study guide provides clear, detailed diagrams that describe the process of thermoregulation and CO₂ regulation.

- (c) Some aspects of thermoregulation are not examinable. Teachers must consult the *Examination Guidelines* to note which aspects are required for assessment.
- (d) When teaching the section on homeostasis, learners must be taught to identify, for each negative feedback mechanism, the stimulus, the control centre that receives the stimulus and formulates a response, the target organ that will respond, and how balance is then restored. The *Mind the Gap* study guide provides a framework of 6 principles against which all negative feedback mechanisms can be learnt.

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 having trouble 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 Guidelines* 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 performance per question in Paper 2

Q	Topic/s
1	Multiple Choice, Terminology, Matching Items, Meiosis,
	Dihybrid cross and Phylogenetic tree
2	DNA profiling, Cloning, Genetics (Pedigree diagram
	and sex-linked inheritance)
R	Evolution
5	
4	DNA, DNA replication and Mitosis



Graph 8.6.2 Average performance per sub-question in Paper 2

Sub-question	Topic/s
1.1	Multiple-Choice Questions
1.2	Terminology
1.3	AB matching
1.4	Meiosis
1.5	Genetics - Dihybrid cross
1.6	Evolution - Evidence for evolution
2.1	DNA profiling
2.2	Genetics - Cloning
2.3	Genetics - Blood groups and genetic cross
2.4	Genetics - Mutations
2.5	Genetics - Pedigree diagram
3.1	Evolution - Natural selection
3.2	Evolution - Human evolution
3.3	Evolution - Scientific investigation (reproductive isolating mechanisms)
3.4	Evolution - Biogeography and Speciation
4	DNA - Location, structure, replication and significance of replication

The worst performance by candidates was recorded in the sub-questions on human evolution, cloning as well as biogeography and speciation.

8.7 ANALYSIS OF LEARNER PERFORMANCE IN EACH QUESTION IN PAPER 2

QUESTION 1: MULTIPLE-CHOICE, TERMINOLOGY, MATCHING ITEMS, MEIOSIS, A DIHYBRID CROSS AND A PHYLOGENETIC TREE

Common errors and misconceptions

- (a) Incorrect understanding of the stem of Q1.1.6 led many candidates to give the phenotypic ratio of the F1 generation, rather than that of the F2 generation.
- (b) In Q1.1.7 candidates were unfamiliar with the scientist who discovered the fossils of *Homo sapiens* and *Ardipithecus*. Candidates are required to know the names of the scientists who discovered the three hominid genera.
- (c) Some candidates could not analyse the graphical representation of artificial selection in Q 1.1.8.
- (d) Q1.1.10 required an application of the scientific method to a new scenario. The poor performance in this question indicates that candidates are unfamiliar with the terminology associated with the scientific process (further evidenced in Q3.3).
- (e) Providing the correct biological terms in Q1.2 was problematic for many candidates. In this regard candidates:
 - Confused similar sounding terms e.g., *homologous* and *homozygous in* Q1.2.1 as well as *chromatin* and *chromatid in* Q1.2.5.
 - Could not provide the term *karyotype* for the shape and arrangement of chromosomes in a somatic cell in Q1.2.6.
 - Named an organism that has a protruding jaw rather than giving the biological term for 'having a protruding jaw'.
- (f) In Q1.3 candidates were not able to differentiate between *continuous* and *discontinuous* variation.
- (g) Marks were lost in Q1.4 because candidates were unable to identify the phase during which crossing over occurred and the number of chromosomes that would occur in a daughter cell. This type of question is often asked and candidates are meant to apply their response to the chromosome number given in the example and not assume that it is for a human cell. Once again learners confused similar sounding terms, viz. *centromere* and *centrosome*.
- (h) It is encouraging to note that candidates are performing better in applying knowledge to a dihybrid cross, as in Q1.5, although the following challenges still occur:
 - Phenotypes are written as a cross, e.g., *white x rough* instead of *White fur and rough texture.*
 - Double letters are used for the genotype of gametes for a single characteristic.
- (i) Q1.6 and Q3.2 were poorly answered and this was due to candidates' inability to read off a *phylogenetic tree* and to construct relatedness between species.

- (a) Subject advisors must ensure that all teachers have copies of the most recent *Examination Guidelines (2021)*. Learners must also have access to the *Examination Guidelines* and use it as a 'tick list' as they study and master each topic.
- (b) Teachers must use the *CAPS* document and the *Examination Guidelines* to establish what content is examinable.
- (c) The scientific process is a crucial component of assessment in Life Sciences and is often tested at a higher cognitive level. Teachers must use relevant and contextual examples to reinforce an understanding of the scientific process (see the section under Q3 for an elaboration on the scientific process).
- (d) 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. Learners should be given activities where they have to distinguish between similar sounding words. This could take the form of a 'match-the-column' type of exercise.

Term	Description
Chromosome	The DNA-containing structure that is made up of genes (found in cells
	that are undergoing cell division)
Centrosome	Structure that is responsible for the formation of spindle fibres during
	cell division in animal cells and is made up of two centrioles
Centromere	Structure that holds two chromatids together in a replicated chromosome
	and which also attaches the chromosome to the spindle fibres during cell
	division
Centriole	Two structures arranged at right angles to each other and together make
	up the centrosome.
Chromatin	The DNA-containing network found in cells in interphase (non-dividing)
Chromatid	A chromosome is made up of two chromatids held together by a
	centromere

The following table lists some terms that often cause confusion:

The diagrams below can help to clarify some of the often-confused terms.





- (e) Pictures of *karyotypes* can be used to reinforce the following concepts:
 - Homologous chromosome pairs
 - Autosomes and gonosomes
 - Non-disjunction and Down syndrome (Trisomy 21)
 - Introduction to meiosis
 - Introduction to genetics
 - Random assortment



- (f) Meiosis is best taught using diagrams from past question papers. Learners must be able to identify:
 - The phase represented in the diagram, with reasons. When a phase is asked for, candidates will only be credited if they indicate whether it is from stage I or II e.g., *Metaphase I.*
 - The correct sequence of phases
 - The structures represented
 - Functions of each structure
 - Site of meiosis in plants and humans
 - Chromosome number in parent and daughter cells
- (g) Teachers must emphasise the difference between the genotype of an *individual* (BBhh) and the genotype of a *gamete* (Bh) in a dihybrid cross.

(h) Too many candidates refer to *phylogenic trees* instead of *phylogenetic trees*. Reinforce the mechanics of how phylogenetic trees work by using the following diagrams.



Phylogenetic trees may also be represented as follows:



Teachers must provide as many examples as possible of the different forms of phylogenetic trees. Almost every question paper has a different version and learners also need to familiarise themselves with those that are plotted on a timeline (as in Q3.2) and identify points of extinction and species that exist during the same period.

QUESTION 2: DNA, CLONING, GENE MUTATIONS AND GENETICS

Common errors and misconceptions

- (a) In Q2.1.1 it is encouraging to note that fewer candidates referred to a *DNA fingerprint* but used the correct term, *DNA profile.*
- (b) Candidates knew how to identify an individual from a DNA profile in Q2.1.2, but were unable to adequately explain how they did it in Q2.1.3. Many candidates wrote that the DNA matched, when it was required that they refer to the bands of the DNA profile. Many candidates confused the interpretation of a DNA profile for paternity testing with

that for forensics, mentioning that 50% of the bands match or that they were similar. it was required that they identify the bands that match exactly.

- (c) Q2.2 recorded the lowest performance in the entire question paper. It is very evident that candidates are not familiar with the steps involved in cloning and the rationale behind each step. This question further tested the candidate's understanding of chromosome complement in gametes and somatic cells.
- (d) Possible reasons for poor performance in Q2.3 may be because:
 - Candidates used incorrect notation to represent blood group alleles.
 - Candidates did not understand that the inheritance of blood group AB displays codominance, whereas the inheritance of blood groups A and B displays complete dominance.
 - Although learners could conduct a genetic cross, they were unable to describe the process involved.
 - Reference was not made to 'alleles' being *dominant* or *recessive*, but rather that a particular blood group is dominant over another.
- (e) In Q2.4.1 most candidates provided a description of a *mutation* rather than that of a *gene mutation*.
- (f) In Q2.4.3, although candidates could show the first steps of the calculation, they lost the last mark as they may not have used a calculator to compute the final answer.
- (g) Candidates indicated the alleles in their answer to Q2.4.4 as superscripts on sex chromosomes (X^DX^d), even though this was not an example of a sex-linked inheritance.
- (h) Confusion still exists between *pedigree diagrams* and *phylogenetic trees* which caused some candidates to lose a mark in Q2.5.1.
- (i) In Q2.5.2 candidates lost the single mark as they only used the symbolic representation to identify the females and did not look to the third generation where words were used.
- (j) Candidates probably lost marks in Q 2.5.3 because:
 - This question was based on a sex-linked allele that is dominant, whereas they generally encounter sex-linked alleles that are recessive in most examples.
 - The pedigree diagram had a combination of symbols and words.
 - They used the incorrect genetic notation for a sex-linked allele.
- (k) Many candidates lost marks in Q2.5.4 because they used the term *normal* instead of *unaffected*. They must use the terms that are provided in the key or in the description provided.
- (I) The poor performance in Q2.5.5 confirms that candidates can represent a genetic cross, but are unable to explain the dynamics of the type of inheritance represented. Candidates did not refer to the inheritance of the Y chromosome from the father and the recessive allele on the X chromosome from the mother.

(a) The different application of DNA profiles needs to be clarified for learners as follows:

Use of DNA profile	What to look for
Forensics (Identification of a criminal, family member or a deceased person)	All the bands of the DNA sample must match exactly with that of the individual in question.
Paternity testing	Each band of the child must match either that of the mother or of the potential father. If the child has a band that does not match that of either parent, then that excludes that male as the father (see diagram below).

Q2.1 from this question paper must be used in the classroom as an example of the use of DNA profiles in forensics.

The following example may be used by teachers to explain how a DNA profile is used to confirm paternity. If there is a contest for paternity between male 1 and male 2, then the DNA profiles of the baby, mother and the two males will be compared as follows:



(b) Subject advisors and teachers should use Q2.2 in this question paper as a teaching tool. The stem of this question explains, in a very concise way, the steps involved in cloning. As the questions are answered, it becomes very clear as to the rationale behind every step. Previous question papers have diagrammatic descriptions of the process of cloning and these could all be compiled into a worksheet for the learners.

(c) Since the inheritance of blood groups display both co-dominance and complete dominance, it is important that learners understand the difference. The only accepted notations for the blood group alleles are as follows:

Phenotype (Blood group)	Genotype	Type of dominance
Α	Homozygous - (I ^A I ^A) Heterozygous - (I ^A i)	Complete dominance of I ^A over i
В	Homozygous - (I ^B I ^B) Heterozygous - (I ^B i)	Complete dominance of I ^B over i
AB	Heterozygous - (I ^A I ^B)	Co-dominance between I ^A and I ^B
0	Homozygous - (ii)	Complete dominance of I ^A and I ^B over i

- (d) Learners must be able to distinguish amongst the following terms:
 - Mutation a sudden change in the genetic composition of an organism
 - Gene mutation a change in the sequence of nitrogenous bases or nucleotides in DNA
 - Chromosomal mutation a change in the normal structure or number of chromosomes

Subject advisors must inform teachers that a description of *point* and *frameshift* mutations are not required.

(e) In Q2.5.3 and Q2.5.5 candidates lost marks for using the incorrect notations to represent alleles. The following table clarifies for learners the correct notations used for each of the different types of inheritance:

Type of inheritance	Brief description of the mode of inheritance
Complete dominance	One allele masks the expression of the other allele; e.g. B is dominant over b
Incomplete dominance	Neither of the alleles are dominant over each other. An
-	intermediate phenotype is obtained when both alleles are
	present.
Co-dominance	Both alleles are equally dominant and both are expressed in
	the phenotype e.g. I ^A and I ^B
Sex-linked	The allele causing the disorder is found on the X-
	chromosome, e.g. X ^H X ^h & X ^H Y
Dihybrid cross	Two characteristics are investigated and therefore there will be
-	four letters in the individual's genotype, e.g. RRYy (two for
	each characteristic)
	Gametes will have two different letters e.g. Ry

Pedigree diagrams are used by examiners to test higher order thinking. The mode and format may differ from one question paper to the next. Some aspects of the diagram may be omitted to test the candidate's ability to synthesise information. Candidates must use the descriptions given in the stem and/or key of a pedigree diagram when asked to provide a phenotype.

When asked to explain inheritance of alleles in an individual/s, learners must apply the following steps:

- Give the phenotype of the individual/s
- State the genotype of the individual/s
- State which allele is inherited from each parent or which each allele is passed on from each parent to the offspring

QUESTION 3: NATURAL SELECTION, HUMAN EVOLUTION, REPRODUCTIVE ISOLATION, BIOGEOGRAPHY AND SPECIATION

Common errors and misconceptions

- (a) Q3.1 was well answered as it required a generic description of natural selection that required simple recall.
- (b) Q3.2 on human evolution was one of the most poorly answered questions in this paper. Some provinces indicated that this topic was not assessed in their preparatory examinations.
- (c) Many candidates, in Q3.2.1, referred to the family as *hominids* or *hominins* instead of *Hominidae* even though it is mentioned in the *Examination Guideline*.
- (d) Candidates were unable, in Q3.2.2, to describe how cultural evidence is used to support the theory of human evolution.
- (e) Interpretation of a phylogenetic tree in Q3.2.3 is still problematic.
- (f) In response to Q3.2.4, candidates were unable to identify *H.ergaster* as a transitional species. This indicates that they are not familiar with the characteristics of a transitional species.
- (g) Many candidates lacked the knowledge and understanding needed to explain how certain fossils are used to support the *Out of Africa hypothesis* in Q 3.2.5 even though it is clearly elaborated in the *Examination Guideline*.
- (h) Candidates were unable to identify the independent variable in Q3.3.1.
- (i) Many candidates referred to sample space instead of sample size in response to Q3.3.2. Also, the term accuracy was used incorrectly.
- (j) In Q3.3.3 candidates incorrectly referred to baseline, fair testing and controlled variables, instead of to the *control*.
- (k) When responding to Q3.3.4 and Q3.3.5 candidates were unable to identify the variables that had to be included in the graph caption and in the conclusion.
- (I) Q3.4.1 was based on past and present distribution of a species and required candidates to have a good understanding of the concept of biogeography and to apply it to the given scenario. Due to the higher cognitive demand of this question, most candidates failed to score maximum marks.
- (m) Candidates incorrectly use the words *species* and *population* interchangeably in Q3.4.2. Up to 4 marks were lost when they started with the species (rather than the population) being separated by a geographical barrier with no further mention of two groups/populations being formed. Furthermore, candidates provided a generic account of speciation, without relating it to the scenario provided.

- (a) The preparatory examinations set by provinces must mimic the NSC examinations as closely as possible in format, content and scope.
- (b) Scientific classification must be revisited in Grade 12 under the topic of human evolution even though it was originally taught in Grade 10. In this regard, learners must know the following:

Family of humans: Hominidae

Genera studied in human evolution:

- Ardipithecus
- Australopithecus
- Homo

Species studied in human evolution:

- Australopithecus africanus
- Homo habilis
- Homo erectus
- Homo sapiens

(Other species may be mentioned in phylogenetic trees, graphs and extracts)

(c) Teachers must explain to learners how each line of evidence is used to support the theory of human evolution. The following table may be used and elaborated on:

Type of evidence	Explanation for evolution
Fossil record	Anatomical features of fossils are examined, compared and placed in sequence from most simple to more complex. Transitional species are those that display characteristics in-between those that it follows and those that it precedes. Transitional species may also share some characteristics with each of these two groups.
Biogeography	The current location of closely related species is an indication of how they may have evolved from a common ancestor. Biogeography may be linked to continental drift and speciation.
Genetic evidence	Similarities and differences between the genetic composition (DNA) of species shows relatedness between species and their possible evolution from a common ancestor.
Cultural evidence	The increasing complexity of items such as artefacts and tools are an indication of the advances (evolution) of the human intellect.

- (d) Teachers need to explain to learners how fossil and genetic evidence support the *Out of Africa* hypothesis. This is clearly elaborated in the *Examination Guidelines*.
- (e) The scientific process is frequently assessed in the Life Sciences. Questions on the scientific investigation will always be text and data-rich and learners must be sensitised to not be intimidated by this. Careful and repetitive reading of the stem and investigative process is required. Also, multiple exposure in a classroom situation can acclimatise learners to the style and format of these questions. The list below provides some terms associated with investigations and their meanings:

Term	Meaning
Observation	What the scientists saw, heard or encountered that encouraged
	them to investigate further.
Hypothesis	A possible prediction and/or explanation of the relationship
	between the two variables.
Aim	Usually starts with the words 'to investigate' and includes both
	variables. It describes what the investigation is trying to find out.
The independent	This is the variable that the scientists will control.
(manipulated) variable	
The dependent	This variable is what reacts or responds to the independent
(responding) variable	variable.
The controlled	All other variables that must be kept constant to ensure the
variables	validity of the investigation so that any effect is ONLY due to the
	change in the independent variable.
The control	A second set up in the investigation that allows a comparison
	with the results of the experiment. The control is identical to the
	experiment except that it excludes the variable that is being
	tested.
Accuracy	Refers to the care taken when making measurements.
Validity	This refers to the experimental method and how appropriate it is
	in addressing the aim of the investigation. For example, keeping
	all other factors constant/identifying the controlled variables
De seelts	neips in making an investigation valid.
Results	The evidence produced during the investigation that will either
	support or retute the hypothesis.
	These may be presented in the form of an extract, a table, a
Improving the	graph or a diagram. Deputte can be made more reliable if:
improving the	Results can be made more reliable if:
reliability of results	Ine investigation is repeated
	A bigger sample size is used
	I he samples are taken randomly
	Many readings are taken to obtain an average reading
	(these depend on the nature of the investigation),
Conclusion	This is directly linked to the aim of the investigation and confirms
	or refutes the hypothesis

- (f) When formulating a caption for the graph, learners must include the variables that they have plotted. Variables used in the conclusion are drawn from the hypothesis or from the aim of the investigation.
- (g) When teaching speciation by geographical isolation, teachers should use the description given in the *Examination Guidelines*, but must emphasise the concept that a population of the common ancestor becomes separated by a geographical barrier and forms two different populations. This is the starting point of speciation. Also, the geographical barrier must be correctly identified when a scenario is given.
- (h) Teachers should consult all past diagnostic reports when they prepare their lessons to address misconceptions identified in previous years.

QUESTION 4: ESSAY ON DNA LOCATION & STRUCTURE, PROCESS OF DNA REPLICATION AND ITS SIGNIFICANCE FOR MITOSIS

Common errors and misconceptions

- (a) In the essay in Q4, many candidates did not present their answers clearly under the following expected headings:
 - Location and structure of DNA
 - Process of DNA replication
 - Significance of DNA replication in mitosis
- (b) Candidates often lost the mark for:
 - Relevance, by including irrelevant information such as on transcription, a description of the structure and location of RNA and the significance of DNA replication to meiosis rather than mitosis.
 - Logical sequence, when they did not present information in a logical fashion. The events in the description of DNA replication were not given in the correct sequence. The significance of DNA replication was not provided in a cause-effect sequence.
 - Comprehensiveness, when they answered only one aspect of the essay in detail or when they answered both aspects, but not in sufficient detail.
- (c) Candidates did not receive credit on the actual content of the essay when they incorrectly:
 - Mentioned components of RNA while discussing DNA
 - Described transcription instead of DNA replication.
 - Identified the location of DNA
 - Stated that replication results in two identical strands instead of two identical DNA molecules with one original and one new strand
 - Provided examples of complementary base pairs
- (d) Many candidates neglected to identify the monomers of DNA as nucleotides and the complementary base pairs that are held together by weak hydrogen bonds.

- (a) The 2021 NSC supplementary examination will be the last question paper to feature an essay in Q4. As from November 2021, the format of the question paper will be according to the amended section 4 of the *CAPS*. Subject advisors must facilitate and implement the amended *Examination Guidelines* (2021). This document outlines the new format of the question paper. There will still be paragraph-type questions and teachers will need to continue developing skills in learners that help them formulate extended writing responses. It is envisaged that an essay-type question of a different nature may be introduced into the question papers in a few years' time.
- (b) The confusion between *DNA replication* and *transcription* is common. Both processes involve the same early steps, but that is where the similarity ends. Teachers must emphasise the differences between these two processes.

The following similarities exist between the processes of DNA replication and transcription:

- Occurs in the nucleus
- The DNA double helix unwinds
- The hydrogen bonds between the N-bases break/the DNA molecule unzips.

The table below outlines differences in the processes of DNA replication and transcription.

DNA replication	Transcription
Both strands act as templates	Only one strand acts as a template
Free DNA nucleotides from the	Free RNA nucleotides from the
nucleoplasm attach to each strand	nucleoplasm attach to the template strand
Complementary base pairing occurs	Complementary base pairing occurs
(A-T) and (G-C)	(A-U) and (G-C)
Two Identical DNA molecules are formed	An mRNA molecule is formed

CHAPTER 9

MATHEMATICAL LITERACY

The following report should be read in conjunction with the Mathematical Literacy question papers of the November 2020 Examinations.

9.1 **PERFORMANCE TRENDS (2016–2020)**

The number of candidates who wrote the Mathematical Literacy examinations in 2020 increased greatly from 2019 by 42 756. There was a marginal increase in achievement at 30% and above from 80,6% in 2019 to 80,8%. At 40% and above, there was an increase from 54,5% in 2019 to 57,7%. Performance in 2020 is by far the best since 2016.

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
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
2020	341 363	275 684	80,8	197 131	57,7







Graph 9.1.2 Performance distribution curves in Mathematical Literacy (percentage)

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 'radius' and 'median'. 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. *English Across the Curriculum* should be overemphasised.
- (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 how 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 and this includes learners' inability to work with big numbers.

9.3 OVERVIEW OF LEARNER PERFORMANCE IN PAPER 1

General comments

- (a) The 2020 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 that the format of the 2021 examination paper will change. Teachers are encouraged to read the new *Examination Guidelines* and use the exemplar papers as a guide.

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 performance per question in Paper 1

Q	Topic/s
1	Short contexts
2	Finance
3	Measurement
4	Maps and Plans
5	Data Handling



Graph 9.3.2 Average performance per sub-question in Paper 1

Sub-question	Topic/s	
1.1	Finance and Data Handling	
1.2	Finance and Data Handling	
1.3	Measurement and Maps, Plans	
2.1	Finance	
2.2	Finance	
2.3	Finance	
3.1	Measurement	
3.2	Probability	
3.3	Measurement	
4.1	Maps, Plans and other representations of the real world	
4.2	Maps, Plans and other representations of the real world	
5.1	Data Handling	
5.2	Data Handling	

9.4 ANALYSIS OF LEARNER PERFORMANCE IN INDIVIDUAL QUESTIONS IN PAPER 1

The change in the sequence of questions, where Q1 was based on short, level 1 contextual questions, still benefitted candidates. Q1 was the best answered question.

QUESTION 1: SHORT CONTEXTS (INTEGRATED LEVEL 1 QUESTIONS ONLY)

Common errors and misconceptions

- (a) Most learners could not identify the type of graph in Q1.1.1.
- (b) In Q1.1.5 some candidates added the values instead of subtracting the values. Others did not round-off to two decimal places notwithstanding the fact that the question was set in the context of money.
- (c) In Q1.2.1 some candidates did not compare the diesel price with the petrol price; they only considered the year in which the diesel price was higher. Hence, candidates were unable to identify the correct year.
- (d) In Q1.2.3 some candidates could not write the ratio in the correct order or simplify the ratio, whilst others wrote a ratio with units.
- (e) A large percentage of candidates could not identify the type of map as a strip chart in Q1.3.1.
- (f) Many candidates had difficulty in converting kilometres to metres in Q1.3.2.
- (g) In Q1.3.3(b) candidates could not identify the distances between places on the strip chart, with the result they left out a value or added an extra value in their answers.

- (a) Teachers should include the different types of maps, as stipulated in the *CAPS*, when selecting material to teach the topic on Maps, Plans and other Representations of the Real World. This will enable learners to extract relevant information from different types of maps with ease.
- (b) Teachers are advised to include questions that require calculating the difference between quantities, 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) Teacher should give learners exercises and/or informal tests on identifying different types of graphs as listed in the *CAPS* as part of their daily class and SBA activities.
- (e) Mathematical skills like reading off values from a graph, map and table should be practised by learners as part of their daily classroom activities.

(f) Ratio is an important part of basic Mathematics in the Mathematical Literacy curriculum. Ratio, as a basic skills topic, is covered in a range of DBE resource materials such as *Mind the Gap* and *The Revision Booklet*. These valuable and available resource materials should be used and integrated into the classwork and homework activities of learners.

QUESTION 2: FINANCE

Common errors and misconceptions

- (a) In Q2.1.2 most candidates could not differentiate between the statement date and the due date. When answers were given, candidates did not write the date in full.
- (b) Most candidates multiplied the value including VAT by 15% to calculate the VAT amount in Q2.1.3.
- (c) In Q2.2.2 candidates could not identify the correct tax bracket or correctly read information from the tariff table.
- (d) In Q2.2.3 most candidates struggled to calculate personal income tax. Candidates made the following errors: substituted incorrectly in the formula, did not apply BODMAS in the simplification step or subtracted the incorrect rebates.
- (e) Many candidates could not interpret the table and did not understand the cost price and selling price in Q2.3.1. Other candidates could not identify and/or divide the correct values to calculate the selling price of the one photo.
- (f) In Q2.3.2 candidates used symbols to represent variables when writing the formula. In Mathematical Literacy words are used or when a symbol is used, the description of the symbol in words must be given as per the *CAPS*.
- (g) In Q2.3.4(a) candidates were unable to give a suitable heading for the graph given.

- (a) Learners should be exposed to all the financial documents that are listed in the *CAPS* and practise reading information from different types of financial documents.
- (b) Teachers should focus on concepts related to VAT calculations, i.e. calculating the amount of VAT that was charged on prices excluding VAT and on prices including VAT.
- (c) Income tax should be allocated more time in class as it is a section that is introduced in Grade 12 for the first time. The income tax table should be introduced and activities built around interpreting the table as well as rebates. The payslip should be re-introduced later, with calculations involving the income tax table.
- (d) Learners must be given exercises within contexts to generate formulae using words for variables. For example, translating an income and expenses scenario into a Mathematical equation where the variables are written in words.
- (e) Educators to revise the basic structure of different types of graphs in Grade 12, i.e. the headings of the graph and labelling the horizontal and vertical axes. They should also revise the names of the different types of graphs as stipulated in the *CAPS*.

QUESTION 3: MEASUREMENT (VOLUME; AREA; PERIMETER; CONVERSIONS)

Common errors and misconceptions

- (a) In Q3.1.1 most candidates only added the legs they could see in the 3-D view, i.e. the legs not visible with the 3-D view were not included in the candidates' solutions.
- (b) In Q3.1.2 some candidates struggled to calculate the radius from the given diameter. Further, candidates struggled with the relationship between radius and diameter. They did not know when to multiply or divide by two.
- (c) In Q3.1.3 the conversion of units was problematic. Many candidates did not realise that the height of the legs should be included when calculating the height of the ottoman.
- (d) Candidates could not calculate the total surface area of the painted sides in Q3.1.4. Many of them did not calculate the area of all the sides. Some candidates calculated the area of one face and did not multiply by the number of faces in the 3-D object.
- (e) In Q3.1.5 candidates struggled to interpret spread rate per coat and how to do calculations involving the spread rate. Working with different units of measurement remains a challenge for most candidates.
- (f) In Q3.2.1 candidates completed the tree diagram but struggled to calculate the probability.
- (g) Some candidates could not express the probability as a fraction in its simplest form, in Q3.2.2.

- (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 use in the calculation for a particular context.
- (c) Teachers must expose learners to tree diagrams and how to use these diagrams to calculate the probability of an event.
- (d) Learners should be taught how the given spread rate per coat is used to calculate the volume of paint required to paint a surface area.
- (e) Teachers should use models to demonstrate 3-D objects and shapes. For example, a packaging box can be used to illustrate the volume and surface area of a 3-D shape. When the sides are torn out, we now have basic 2-D shapes.

QUESTION 4: MAPS AND PLANS

Common errors and misconceptions

- (a) Some candidates gave point by point directions and not the general compass direction as stated in Q4.1.3. They misinterpreted the phrase 'general direction'.
- (b) In Q4.1.5 candidates were able to add distances between the towns but failed to subtract this sum from the given distance between Cape Town and Worcester in order to calculate the distance between Wellington to Tulbagh.
- (c) Some candidates, in Q4.2.1, could not interpret the layout plan of the motorcycles on the trailer and as the result they were unable to calculate the required lengths/distances correctly.

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) Teaching should also enhance reading information from regional maps, layout plans and different type of maps as listed in the *CAPS*.

QUESTION 5: DATA HANDLING

Common errors and misconceptions

- (a) Some candidates, in Q5.1.1, confused team GTC with team TGA while others gave the name of the gymnast instead of the name of the team.
- (b) In Q5.1.2 some learners could not identify the minimum and the maximum scores. This revealed that some candidates have a limited understanding of the concept of range.
- (c) In Q5.1.6 most candidates considered both the junior and senior decisions. As a result, they divided 4 by 10.
- (d) Some candidates did not arrange the values in ascending order while other candidates calculated the mean in Q5.1.7.
- (e) In Q5.2.1 candidates struggled with writing very large numbers in words.
- (f) Candidates found it very difficult to round off to the nearest 10 000, as required in Q5.2.2.
- (g) In Q5.2.4 some candidates could not draw two different types of graphs on the same set of axes.

- (a) Teachers must place emphasis on the measures of central tendency in the FET phase for Mathematical Literacy. A glossary, in the learners' books, with definitions of terms such as mode, mean and median becomes a valuable resource and it links with the National English Language strategy across the curriculum.
- (b) Learners should be exposed to writing out big numbers (hundreds, thousands, millions and billions) and doing calculations with percentages.
- (c) The basic skills topics such as Numbers and Operations should be integrated when teaching application topics in the classroom. Before learners attempt a real-life, authentic context problem in a class activity or SBA task, a moment should be allowed to ask the question: 'What type of basic mathematical calculation do I need in order to solve the real-life, authentic problem?'
- (d) Teachers must expose learners to more questions on the classifying and organising of data and develop the skill in learners to extract information from tables and graphs.

9.5 ANALYSIS OF LEARNERS' PERFORMANCE IN INDIVIDUAL QUESTIONS IN PAPER 2

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









Figure 9.5.2 Average performance per sub-question in Paper 2

Sub-question	Topic/s	
1.1	Data Handling, Probability and Finance	
1.2	Finance and Measurement	
2.1	Measurement and Finance	
2.2	Measurement and Finance	
3.1	Data Handling and Probability	
3.2	Maps and Plans and Finance	
4.1	Maps and Plans, Probability and Finance	
4.2	Data Handling and Finance	

9.6 ANALYSIS OF LEARNER PERFORMANCE IN INDIVIDUAL QUESTIONS IN PAPER 2

QUESTION 1: DATA ANALYSIS; MEASUREMENT AND FINANCE

Common errors and misconceptions

- (a) Q1.1.1 was well answered by most candidates but some candidates incorrectly used the data for Slovenia instead of Slovakia.
- (b) In Q1.1.2 some candidates did not understand the concept of range. They used the second lowest value in the data set although it was stated that N was the lowest value. The consequence of not choosing the correct data points meant that candidates could not do a reverse range calculation correctly.
- (c) Many candidates did not link the trend to a time frame and hence lost one mark in Q1.1.3.
- (d) In Q1.1.4 most candidates either did not know the formula for percentage change or substituted incorrectly and hence this question was poorly answered. Some learners used an incorrect formula, for example (new – old/new x 100%).
- (e) Many candidates in Q1.1.5 did not understand the word 'decline' and hence answered the question incorrectly.
- (f) Most candidates answered Q1.1.6 incorrectly. Some candidates either used either the number of children or the monthly cost to get the ratio and were awarded only two of the six marks for their efforts. Very few candidates understood the concept more than 5:1 and hence they lost mark for the conclusion.
- (g) Most candidates, in Q1.2.1, could not calculate the selling price using the concept of profit as a percentage. Many candidates used only 120% (profit margin) instead of 220% (selling price).
- (h) Candidates did not know the difference between diameter and radius as was required in Q1.2.1. Candidates substituted mixed units (mm and cm) into the given formula. Many candidates made this error: Volume = 3,142 × (64 mm)² × 30 cm. In other words, they worked with the diameter and not the radius and they mixed units of measurement. Some candidates calculated the volume for one bag of marbles instead of two bags.
- (i) Most candidates did not add 0,5 cm twice to calculate the new diameter in Q1.2.3.

- (a) Learners must be taught to read information clearly and to use the correct data set when answering questions based on a table of data.
- (b) Learners must practise writing down ratios, converting to unit ratios and arriving at conclusions from a calculated ratio.
- (c) Teachers should drill basic formulae which are not given in the question paper, such as percentage change.
- (d) Teachers must emphasise that all dimensions must be in the same unit before one can substitute into a formula to calculate perimeter, area or volume.
- (e) Learners should be made aware that the conclusion mark will not be given if there are no viable calculations.

QUESTION 2: MEASUREMENT AND FINANCE

Common errors and misconceptions

- (a) In Q2.1.1 many candidates wrote down the individual amount for the CM and IM, but did not add them together.
- (b) In Q2.1.3(a) many candidates calculated the number of hours worked but did not convert the number of hours to days. Candidates did not include the hours set aside for breaks and meals in the total. Some candidates used the wrong total of markers (total number of markers: 30 instead of the real number 23).
- (c) Most candidates did not even attempt Q2.1.3(b). Many candidates did not relate 'hours worked' to the 'hours claimed'.
- (d) In Q2.1.3(c) very few candidates could give a reason why marking finished before the expected time.
- (e) In Q2.1.4 some candidates did not calculate or add the transport amount. Other candidates only added the amount claimed per marking official and did not multiply with the hours and number of officials to make a conclusion, for example:

Total claimed = 19 303,95 + 19 303,65 + 13 763,75 + 10 166,00 = R62 537,05, and therefore the budget was enough.

- (f) In answering Q2.2.1, most candidates only calculated the area of the wood and did not proceed further. Other candidates did not know how to find the diameter and hence could not find the area of the big circle. As a result, this question was poorly answered.
- (g) In Q2.2.2 many candidates did not recognise that 12 semi-circles constituted 6 circles. Other candidates did not convert the 38 mm to metres before substitution.
Suggestions for improvement

- (a) Teachers should emphasise that 'total' means to add and give a single value.
- (b) Learners should be exposed to questions involving changing time from minutes to days. They also need to be told that 'breaks' are included as time on duty and must be included when making daily calculations.
- (c) Teachers should reinforce the concept of changing dimensions to the same unit, a skill that is taught in grade 10.
- (d) More multi-step activities on area and volume should be given to learners for them to master these concepts.
- (e) Learners should practise Level 4 questions so that they understand how and when to make conclusions.

QUESTION 3: DATA HANDLING, MAPS AND PLANS AND FINANCE

Common errors and misconceptions

- (a) Many candidates, in Q3.1.1, could not substantiate why the set of given data was discrete.
- (b) Most candidates answered Q3.1.2 correctly but some candidates used the incorrect data set.
- (c) In Q3.1.3 many candidates struggled with the reverse mean calculation. They totally ignored the missing value, Y, and used the known values to determine a new mean value.
 89+90+87+90+83+83+94

Their incorrect calculation was: Mean = $\frac{89+90+87+90+83+83+94...}{17}$

- (d) Most candidates gave an answer greater than the correct answer in Q3.1.4. This showed that they did not understand the word 'differed'.
- (e) In Q3.1.5 many candidates could not calculate the quartiles from an even set of data, and hence could not calculate the interquartile range. Other candidates determined the range instead of the IQR.
- (f) Q3.1.6 was poorly answered as candidates could not identify which students obtained a distinction. Candidates struggled to express probability in a simplified fractional form. Some candidates did not include the value of Y that was calculated in Q3.1.3. Most candidates gave the answer as a decimal fraction not a simplified fraction.
- (g) Candidates seem not to understand signs used in map-work and hence Q3.2.2 was poorly answered.
- (h) In Q3.2.3 candidates were expected to turn the map around to make it easier to read direction. Some candidates gave the route instead of the compass direction.
- (i) Candidates showed poor skill in measurement and using scale and hence Q3.2.3 was poorly answered.

(j) In Q3.2.5(b) candidates did not subtract the free parking from the time parked. Candidates could also not convert minutes to hours, for example, 3 hours 25 minutes was converted to 3,25 hours instead of 3,4166667. It means they did not divide 25 minutes by 60 minutes.

Many candidates performed the following incorrect calculation: Rate per hour = $\frac{\pounds 79,75}{3.25}$

Suggestions for improvement

- (a) Learners should be given a comprehensive list of terminologies to learn in data analysis, such as discrete, continuous, differed, more than and less than.
- (b) Teachers should teach learners the skill of reverse calculation in Data Handling.
- (c) Learners must be given practise in selecting the correct data set when given multiple sets of data.
- (d) Learners need to practise using the calculator to simplify fractions or change fractions into decimals and percentages.
- (e) Teachers should emphasise that maps can be turned, so that the North line is facing forwards. This will allow learners to deal with questions on direction much easier.
- (f) Learners need to practise using scale to calculate real-life (actual) distance.

QUESTION 4: FINANCE AND MAPS AND PLANS

- (a) In Q4.1.1 some candidates did not understand the concept 'odd-numbered seat'. Other candidates could not correctly count the number of seats in the theatre. Some candidates used a denominator of 4 instead of 288.
- (b) Some candidates, in Q4.1.2, wrote fourth row instead of Row D.
- (c) In Q4.1.3 many candidates could not describe a route from one seat to another seat.
- (d) When answering Q4.1.4, some of the candidates used the Friday and Saturday tariffs instead of Thursday and Sunday tariffs. Some candidates also calculated the number of people incorrectly by only choosing some sections and not all the sections. Most of the candidates could not calculate the original amount (using the 10% Australian VAT) from what they had calculated.
- (e) In Q4.1.5 some candidates did not first convert the amount in Australian dollars to USA dollars and then convert to South African rand. Other candidates could not identify the correct ticket price of \$30,50. They used either \$34,70 or \$28,60 instead.
- (f) Most candidates, in Q4.2.1, could not read the vertical scale correctly or plot values given to two decimal places correctly and hence lost marks when drawing the bar graph.
- (g) In Q4.2.2 most candidates could not read the correct months from the graph. Some chose the correct month but used values from a different month, e.g. June = 2,95 1,63 = 1,32.

(h) Most candidates could not read the correct inflation rate in Q4.2.3. They approached the question as if they were calculating simple interest rather than inflation.

- (a) Teachers should ensure that learners know the difference between odd and even numbers.
- (b) Learners must practise reading the information provided and question posed before explaining to the teacher what is required in the question.
- (c) Teachers should emphasise that the rate of VAT in other countries is different to South Africa but the methodology in calculations is the same.
- (d) Learners should practise giving directions using their own environment to help them understand how to give directions from unseen maps.
- (e) Learners should be exposed to graphs with different types of scale because any scale can be tested.

CHAPTER 10

MATHEMATICS

The following report should be read in conjunction with the Mathematics question papers of the November 2020 NSC examination.

10.1 PERFORMANCE TRENDS (2016–2020)

The number of candidates who wrote the Mathematics examination in 2020 increased by 11 281 in comparison to that of 2019. The performance of the candidates in 2020 showed a slight decline at the 30% level from 54,6% in 2019 to 53,8% and a slight increase at the 40% level from 35,0% in 2019 to 35,6%.

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
2016	265 810	135 958	51,1	89 084	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
2020	233 315	125 526	53,8	82 964	35,6

Table 10.1.1 Overall achievement rates in Mathematics

Performance in the 2020 examination revealed a deficiency in the understanding of basic concepts across some topics in the curriculum.

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 problemsolving questions across all topics in the curriculum, starting in the earlier grades.



Graph 10.1.1 Overall achievement rates in Mathematics (percentage)

Graph 10.1.2 Performance distribution curves in Mathematics (percentage)



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 performance per question in Paper 1



Graph 10.3.2 Average performance per sub-question in Paper 1

10.4 ANALYSIS OF LEARNER PERFORMANCE IN EACH QUESTION IN PAPER 1

QUESTION 1: ALGEBRA

- (a) In Q1.1.1 some candidates divided throughout by x. In doing so, they reduced a quadratic equation to a linear equation and in the process 'lost' a root of the equation. A few candidates factorised the expression as (x-6)(x+1) or (x-3)(x+2). Both of these were incorrect.
- (b) Rounding off the answers to two decimal places is still a problem for some candidates. In Q1.1.2 some candidates rounded -0,876... to -0,87 instead of -0,88. A few candidates rounded off to three decimal places.
- (c) In answering Q1.1.3 many candidates treated the inequality as an equation. Their answer would read: (1-x)(x+2) < 0 followed by $\therefore 1-x < 0$ or x+2 < 0. These candidates did not realise that the question dealt with the product of two numbers and that the product of two negative numbers does not yield a negative result. In addition, the use of the words *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. Few candidates were unable to square the binomial on the RHS correctly, for example they wrote $(x-2)^2 = x^2 + 4$ instead of $(x-2)^2 = x^2 4x + 4$. Very few

candidates checked if the solutions obtained were valid in the original equation and consequently failed to reject x = -2 as a solution.

- (e) In Q1.2 some candidates made the following errors when rewriting the linear equation in terms of one variable: y=x-3 or y=x+3 x=y+3. Other candidates overlooked the factor of y in the second term when substituting into the quadratic equation. They would write $2(3-y)^2 + 4(3-y) - y = 15$ instead of $2(3-y)^2 + 4(3-y)y - y = 15$. Some candidates used the quadratic formula to solve the equation $-2y^2 - y + 3 = 0$. However, they wrote their answer as $x = -\frac{3}{2}$ or x = 1 instead of $y = -\frac{3}{2}$ or y = 1.
- (f) Many candidates did not know how to answer Q1.3. A few candidates managed to arrive at n < 11,18 but could not conclude that n = 11. Some candidates rewrote the inequality as $n^{200} 5^{300} < 0$. Then went on to write $\sqrt{n^{200} 5^{300}} < \sqrt{0}$. From this step, a few then went on to write $n^{100} 5^{150} < 0$. This was a mathematical breakdown and no marks were awarded even if the candidate arrived at the correct answer from this point.

Suggestions for improvement

- (a) More thorough teaching of factorisation in Grades 9 and 10 is needed. Emphasis should be placed on how to identify the type of factorisation that is applicable to the given expression.
- (b) Teachers should not take for granted that learners know how to round off a number to the required number of places. Where necessary, this skill should be retaught in Grades 11 and 12.
- (c) 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.
- (d) Teachers should take some time, preferably in Grade 10, to focus on teaching learners how to represent inequalities (e.g. -2 < x < 1; x < -2 or x > 1) on a number line and also how to write an inequality from the illustration on a number line. This will benefit learners as they are required to write inequality solutions for a number of questions in both examination papers.
- (e) Teachers should explain the difference between *and or* in the context of inequalities. Learners cannot use these words interchangeably as they have different meanings.

QUESTION 2: PATTERNS

Common errors and misconceptions

(a) In Q2.1 some candidates incorrectly assumed that the given sequence was quadratic and proceeded to calculate the second difference. A reasonable number of candidates were only able to derive one equation in *x* and *y*. As a result, they were unable to use the method of simultaneous equations to calculate the values of *x* and *y*. Very few candidates realised that they could have solved this question by inspection.

- (b) In answering Q2.2.2, some candidates confused *n* with T_n . Instead of substituting *n* with 50, they incorrectly assumed that T_n was 50.
- (c) In answering Q2.2.3 some candidates used the incorrect value of *a* in the formula for the sum of an arithmetic sequence. Instead of using a = 9, from the sequence of first differences, they used the value of *a* that was calculated in Q2.2.1. Some candidates worked backwards, i.e. they started with $S_n = 6n^2 + 3n$ and showed this formula to be true by substituting different values of *n* into it. This was not acceptable. A few candidates did not realise that the sequence of first differences of a quadratic sequence is linear. These candidates incorrectly used the sum formula for a geometric sequence instead of the sum formula for an arithmetic sequence.
- (d) Many candidates assumed that the sum of the first differences was 21 060 instead of the n^{th} term of the quadratic sequence being 21 060. They incorrectly started their answer as $21060 = 6n^2 + 3n$. Some candidates left out the '= 0' when rewriting the equation in the standard quadratic form. Subsequently, they arrived at an algebraic expression for which the value of *n* could not be calculated. Some candidates failed to recall that the value of *n* should be a natural number.

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.
- (b) Remind learners that *n* cannot be a negative number, zero or a fraction. When solving for *n*, learners should arrive at a natural number solution. If this is not the case, then they have made a mistake in their working.
- (c) 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 them to calculate the value of the n^{th} term or the sum of the first *n* terms.
- (d) Also expose learners to number pattern questions that contain one or more variables. Inform learners that in order to solve for two variables simultaneously, they will first need to derive two equations in these variables.
- (e) When teaching quadratic number patterns, it is essential to show learners how the formulae: $T_1 = a + b + c$, the first term of the first differences = 3a + b and the second difference = 2a, are deduced.

QUESTION 3: PATTERNS

- (a) In Q3.1 some candidates were unable to expand the series correctly. Many candidates correctly calculated *r* as $\frac{1}{3}$ but were unable to conclude that the series converges because -1 < r < 1. Having calculated the value of *r* correctly, some candidates then correctly calculated the sum to infinity. This was not required and candidates were not given credit for doing so. Some candidates read 4.3^{2-p} as $(4,3)^{2-p}$ instead of $4(3^{2-p})$
 - . These candidates then stated that *r* was 4,3.

(b) When answering Q3.2 some candidates made the assumption that $S_n = \frac{2}{9}$. This was incorrect. Most candidates did not see the link between *k* and *p*. Some candidates expanded the series correctly but then calculated $r = 3^{-p}$ instead of $r = \frac{1}{3}$. Many candidates wrote $a = 4.3^{2-p} = \frac{2}{9}$ instead of the sum to infinity $S_{\infty} = \frac{a}{1-r} = \frac{2}{9}$.

Suggestions for improvement

- (a) 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.
- (b) Learners should also be exposed to writing a series in sigma notation.
- (c) They should know that $\sum_{k=1}^{\infty} T_k$ refers to sum to infinity and that $\sum_{k=p}^{\infty} T_k = S_{\infty} S_{p-1}$.

QUESTION 4: FUNCTIONS (HYPERBOLA, PARABOLA, STRAIGHT LINE AND ITS INVERSE)

- (a) In Q4.1 instead of the correct answer of x=1; y=2, some candidates gave as the answer: p=1; q=2 or vertical asymptote = 1; horizontal asymptote = 2 or x∈R, x≠1; y∈R, y≠2. None of these were accepted as correct.
- (b) In answering Q4.1.2 many candidates did not realise that the gradient of this axis of symmetry of the hyperbola was -1. Some common incorrect answers were y = -3x + 2, y = -x and y = x + c.
- (c) When attempting Q4.1.3 some candidates calculated the intercepts with the axes correctly but had incorrect asymptotes. Of these candidates, some realised that there was a problem with their calculations and so did not sketch the graph. Others sketched a hyperbola that cut the asymptotes. The latter group of candidates showed very little understanding of the concept of *asymptote*. Some candidates correctly calculated the *x* and *y* intercepts but did not indicate these on the graph. A few candidates drew a decreasing function instead of an increasing function.
- (d) Many candidates were unable to read off the coordinates of the turning point from the given equation in answering Q4.2.1. Instead, they first wrote the equation in the form $y = ax^2 + bx + c$, then calculated the axis of symmetry and finally the minimum value. These candidates wasted a lot of time. Some candidates gave the *x*-coordinate of point A as 5 instead of –5 whilst a few incorrectly assumed that point A was on the *y*-axis and gave the *x*-coordinate as 0. A small number of candidates gave the answer as (-8; -5) instead of (-5; -8).
- (e) The following incorrect answers were given in Q4.2.2: y > -8 (the minimum value was excluded); $y \le -8$ (candidates were unable to establish that the value of y increases

as they move up along the *y*-axis) or $y \in R$ (candidates showing little understanding that the graph only exists for a portion of the *y*-axis).

- (f) In Q4.2.3 many candidates were able to establish that the value of m was -5. However, some of them substituted the value of -5 into the equation for f instead of g. A reasonable number of candidates incorrectly calculated the x- and y-intercepts of g instead of the coordinates of D. These candidates showed a lack of understanding of the question.
- (g) In Q4.2.4 very few candidates recognised the shape as a trapezium, and since most of the measurements were known, they could have calculated the area directly by using the formula for the area of trapezium. It seems as if the formula for the area of a trapezium is not well known by candidates. Many candidates broke up the area into two triangles: one right-angled and the other not. They then substituted the length of two sides of the triangle that was not right-angled into the formula: area = $\frac{1}{2}bh$. These candidates did not realise that the pre-requisite to using this formula is a perpendicular height.
- (h) In Q4.2.5 many candidates swopped *x* and *y* in the equation, and could not correctly

make y the subject of the formula. From $\frac{1}{2}y = x - \frac{9}{2}$, candidates wrote down $y = \frac{x - \frac{9}{2}}{\frac{1}{2}}$

and could not simplify this further. Many candidates gave an answer in terms of logarithms.

(i) Very few candidates answered Q4.2.6 correctly. From their responses it appeared as if most candidates did not have a clear strategy, but just tried any approach that might have some merit, e.g. equating h(x) and f(x). Many candidates made mistakes when rewriting $f(x) = \frac{1}{2}(x+5)^2 - 8$ in the form $f(x) = ax^2 + bx + c$, and therefore could not determine f'(x) correctly.

- (a) Teachers should pay attention to the concepts and definitions when teaching functions.
- (b) When teaching the hyperbola, start with the 'basic graph' $y = \frac{a}{x}$ and develop the general hyperbola $y = \frac{a}{x+p} + q$. This will enable learners to understand the effect of the changes in the variables *a*, *p* and *q* on the graph, its asymptotes and axes of symmetry.
- (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.

- (d) Teach learners both formats of the equation of the parabola, namely $y = a(x + p)^2 + q$ and $y = ax^2 + bx + c$. Also remind learners when the parabola is given in the form $y = a(x + p)^2 + q$, then the coordinates of the turning point are (-*p*; *q*).
- (e) Revise the calculation of the areas of different types of two dimensional figures from time to time.
- (f) Learners need to be reminded that inverses to straight lines and parabolas are not logarithmic functions.

QUESTION 5: FUNCTIONS (EXPONENTIAL AND INVERSE)

Common errors and misconceptions

- (a) Some candidates swopped the coordinates and gave the answer as (1; 0), instead of (0; 1). They did not realise that y=0 on the *x*-axis.
- (b) In Q5.2 some candidates wrote 9 as 3^3 instead of 3^2 , and therefore concluded that x = -3. A few candidates attempted to solve the equation $3^{-x} = 9$ as follows:

$$\frac{3^{-x}}{3} = \frac{9}{3}$$
$$\therefore -x = 3$$
$$x = -3$$

This was a mathematical breakdown.

(c) Many candidates determined the domain of f, instead of f^{-1} , and gave $x \in R$ as the answer to Q5.3. Some candidates gave the answer as $y \in (0,\infty)$. These candidates were under the impression that all *x*-variables change to *y* in the inverse without realising that the domain of the inverse remains a set of values of *x*. Some candidates used the incorrect notation when presenting their answers, for example $x \in (0,\infty)$ or

 $x \in [0;\infty]$ instead of $x \in (0;\infty)$.

- (d) A common incorrect response to Q5.4 was that *h* was a vertical stretch by a factor of 27. In this instance, candidates failed to respond to the question that asked about the translation. Many candidates rewrote the equation as $y = 3^{-x+3}$, and then said that the graph shifted 3 units to the left, instead of to the right.
- (e) Many candidates did not realise that Q5.5 was linked to Q5.4. Instead they opted for the algebraic solution to this question. In doing so, a number of candidates made errors in the sign of the answer. They wrote x < 3 instead of x > 3.

Suggestions for improvement

(a) Teachers should spend some time discussing the basic concepts of functions: all points on the *x*-axis have a *y*-coordinate of 0 and all points on the *y*-axis have a *x*-coordinate of 0. The domain is always a set of *x*-values and the range is always a set of *y*-values.

(b) Although Transformations is not a topic in the FET curriculum, it is essential that teachers teach the effect of a, p and q on the basic graphs as a transformation of the basic graph. In this regard, the correct transformation terminology must be used when describing the transformation of the basic graph to the new graph.

QUESTION 6: FINANCE

Common errors and misconceptions

(a) Many candidates did not realise that there was an immediate payment followed by payments at the end of each month for 12 years. They used n = 144 instead of n = 145in the future value annuity formula in Q6.1.1. Despite the guestion indicating regular recurring payments, some candidates incorrectly used the compound increase formula. Other common errors were the use of n = 12, i.e. incorrectly assuming that yearly payments were made and the use of an incorrect value of $\frac{0.075}{100}$ for *i*.

- In Q6.1.2 many candidates used the correct formula but substituted n=1 and (b) i = 0,075 instead of n = 12 and $i = \frac{0,075}{12}$. They did not realise that the compounding period was still monthly and not yearly. Some candidates calculated the period from 31 January 2032 to 31 January 2033 as 13 months, instead of 12.
- Many candidates substituted the given final value as P and the initial cost as A in the (c) reducing balance depreciation formula. This was a mathematical breakdown as the final value after depreciation cannot exceed the initial cost of an item. A number of candidates failed to correctly convert from exponential form to log form. In many cases $0,37 = 0,78^n$ was written as $n = \log_{0.37} 0,78$, instead of $n = \log_{0.78} 0,37$.
- (d) In Q6.2.1 some candidates used n = 71 instead of n = 72 in the present value annuity formula. Some candidates calculated the monthly payment instead of the loan amount.
- Very few candidates had any idea how to respond to Q6.2.2. Many calculated the (e) balance after 60 payments and subtracted this amount from the original loan amount. They failed to take into consideration the total amount repaid over the period. Some candidates confused the balance outstanding after 60 payments were made as the amount of interest that was paid over the period. Some candidates calculated the rate of interest of the loan rather than the amount of interest.

- (a) It is a good strategy for teachers to start with the standard case of an investment annuity, i.e. where deposits are made at the end of each month of the investment period and the withdrawal is made immediately after the deposit is made. Thereafter, teachers should change when the deposits are made and discuss how these changes impact on the standard formula.
- (b) It is essential for learners to be able to accurately change from exponential form to logarithmic form. Teachers should teach this concept thoroughly.
- Learners need deeper insight into the relevance of each of the formulae and under (c) 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.

- (d) Discuss the two ways of calculating the outstanding balance of a loan. The first is when the number of payments made is known and the second is when the number of payments outstanding is known.
- (e) Teachers should demonstrate all the steps required when using a calculator.

QUESTION 7: CALCULUS

Common errors and misconceptions

- (a) In Q7.1 many candidates made the following notational errors: $f(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h} \text{ or } \lim_{h \to 0} = \frac{f(x+h) - f(x)}{h} \quad \frac{\lim_{h \to 0} f(x+h) - f(x)}{h \to 0}.$ They lost a mark for these errors. Some candidates made the following mistakes when removing brackets: $2(x+h)^2 = (2x+2h)^2$, $-(2x^2-1) = -2x^2 - 1$, $2(x+h)^2 = 2x^2 + 2xh + 2h^2$ or $f(x+h) = 2(x+h)^2$.
- (b) The common error in Q7.2.1 was to rewrite $\sqrt[5]{x^2}$ as $x^{\frac{5}{2}}$ instead of $x^{\frac{2}{5}}$. Another common response was rewriting the first term in differentiable form and writing the derivative of the second term in the same step. It was incorrect to perform two

different processes in the same step.



(c) Many candidates did not recognise that the numerator in Q7.2.2 was a difference of two squares. Consequently, they had difficulty in factorising and simplifying the expression. Many candidates resorted to this incorrect method of simplification: $\frac{4x^2 - 9}{4x + 6} = \frac{4x^2}{4x} - \frac{9}{6} = x - \frac{3}{2}$ This constituted a mathematical breakdown and candidates were not credited for arriving at the correct simplified answer. Some candidates incorrectly differentiated the numerator and denominator: $\frac{4x^2 - 9}{4x + 6} = \frac{8x}{4} = 2$.

- (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) To apply the rules of differentiation, learners need a strong background in basic algebraic operations, e.g. factorisation, converting surds to exponential form and simplification of algebraic fractions. These skills should be revised before learners are expected to differentiate examples that contain surds or when algebraic manipulation is required.

QUESTION 8: CALCULUS

Common errors and misconceptions

- (a) It was evident that candidates knew the interval for which the graph was increasing. However, they were unable to write this interval using the correct notation. The following incorrect answers were noted: 2 > x > -1, -1 and 2 and x = -1 or x = 2.
- (b) Many candidates were unable to answer Q8.2 because they were unable to calculate the second derivative of g(x). Some used the derivative given in Q8.4 to obtain the answer to Q8.2. This was not acceptable.
- (c) In answering Q8.3 some candidates gave their answers as specific values, e.g. -1, 0 or 2, instead of an interval. Many candidates did not link the answer to Q8.2 with the answer to Q8.3.
- (d) Most candidates did not use the method of determining the derivative of $g(x) = ax^3 + bx^2 + cx$, and then equating coefficients with those of the given derivative, $g'(x) = -6x^2 + 6x + 12$. Many simply wrote down the answer only, giving the impression that they integrated $g'(x) = -6x^2 + 6x + 12$.
- (e) Most candidates did not realise that the tangent to g has its maximum gradient at the point of inflection. Some candidates calculated the equation of the tangent to the graph at x = 2, the maximum turning point.

Suggestions for improvement

- (a) When teaching graphs of cubic functions, teachers should inform learners of both methods of determining the *x*-coordinate of the point of inflection: solving for *x* in f''(x) = 0 as well as determining the *x* value midway between the two turning points.
- (b) Teachers should teach concavity in such a way that learners can visually identify where a graph is concave up or concave down. In this way, learners should deduce that the point of inflection is critical to establishing the concavity of a cubic graph.
- (c) Learners should be taught that the maximum (or minimum) gradient of a tangent to a cubic curve occurs when the derivative function is at a maximum (or minimum), i.e. at the turning point of the derivative function. This is equivalent to the second derivative of the function being zero or at the point of inflection. Using graphs of the function, its first derivative and its second derivative on the same system of axes, is a useful way of explaining this concept.

QUESTION 9: CALCULUS

Common errors and misconceptions

(a) In Q9.1 many candidates used the formula for volume of a rectangular prism instead of the formula for surface area. Some candidates attempted to work backwards from the answer but were unsuccessful in their attempts.

(b) Most candidates calculated the derivative of the Cost function, $C(w) = 90w^2 + 48wh$, as C'(w) = 180w + 48h. This was incorrect because: firstly, *h* is not a constant and secondly, *h* is a function in *w*, i.e. *h* is dependent on *w*. Candidates made mistakes in making *h* the subject of the formula in $V = l \times b \times h = 3w^2h = 5$. Instead of $h = \frac{5}{2w^2}$, they

obtained
$$h = \frac{5}{3}w^2$$
 or $h = 5 - 3w^2$.

Suggestion for improvement

The section on measurement, i.e. surface area and volume, is generally not well taught. 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) Many candidates did not attempt Q10.
- (b) In Q10.1 many candidates gave the answer as 10!. This was incorrect. These candidates overlooked the phrase in the question which stated that digits may be repeated.
- (c) Many candidates did not answer Q10.2.1 correctly because they failed to interpret and apply the restrictions correctly.

Some candidates wrote $(8!\times10!\times10!)\times(8!\times8!\times10!)\times(2!\times10!\times10!\times10!)$ instead of $(8\times10\times10)\times(8\times8\times10)\times(2\times10\times10\times10)$, which is a clear indication that they do not understand the general counting principle. Other candidates gave the answer as $(8\times10\times10)+(8\times8\times10)+(2\times10\times10\times10)$. This was also incorrect.

(d) Very few candidates attempted Q10.2.2 as this question was dependent on the answers to Q10.1 and Q10.2.1.

Suggestion for improvement

Teach learners the Fundamental Counting Principle in such a way that they will be able to reason answers, instead of trying to remember rules.

QUESTION 11: PROBABILITY AND COUNTING PRINCIPLES

- (a) In Q11.1 some candidates wrote the answer as 0,5+0,5 instead of $0,5 \times 0,5$. This reflects a misunderstanding of the concepts of *and* or in the description of two consecutive events.
- (b) In Q11.2 some candidates did not understand the meaning of the concept *at least* and gave the answer for the three events in which the bull's eye was hit exactly twice. They omitted the instance where the bull's eye was hit three times.

Suggestion for improvement

A tree diagram is a useful aid in dealing with problems that involve compound events. It allows learners to visualise the problem and extract the necessary information from it. Learners should be encouraged to draw tree diagrams when answering questions on probability.

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 the Trigonometry questions in this paper have their origins in a poor understanding of the basics and the foundational competencies taught in the earlier grades.
- (d) 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 because of the dependence on a calculator.

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 performance	per question in Paper 2
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Q	Topic/s		
1	Data Handling		
2	Data Handling		
3	Analytical Geometry		
4 Analytical Geometry			
5 Trigonometry			
6	Trigonometry		
7	Trigonometry		
8 Euclidean Geometry			
9	Euclidean Geometry		
10 Euclidean Geometry			



Graph 10.6.2 Average performance per sub-question in Paper 2

10.7 ANALYSIS OF LEARNER PERFORMANCE IN EACH QUESTION IN PAPER 2

QUESTION 1: DATA HANDLING

- (a) In Q1.1 some candidates did 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 y = 9,50 0,91x. Some omitted the variable *x* in the equation.
- (b) Whilst many candidates were able to draw the regression line correctly, some candidates drew the line of best fit. Some candidates drew a regression line that extended beyond the points on the scatter plot. This is incorrect since there is insufficient information to predict the behaviour of the data outside the given dataset.
- (c) Some candidates substituted incorrectly in Q1.3, i.e. they substituted 69 for *y* instead of *x*. Some candidates did not know the meaning of the word predict. These candidates substituted a random value for *x* into the equation.
- (d) Some candidates did not realise that this question required the value of *r*. Instead they commented on the strength of the relationship between the Mathematics and Science marks.

(e) In answering Q1.6 many candidates stated that the Mathematics marks were higher than the Science marks instead of commenting on the trend in the data. These candidates did not know the meaning of the word 'trend'.

Suggestions for improvement

- (a) Learners should be given multiple opportunities to practise calculator skills. Teachers should emphasise correct rounding procedures.
- (b) Teachers should explain each definition or concept in detail. Statistical language should be used in class so that learners become familiar with the terminology.
- (c) Learners should be taught the difference between a line of best fit and a regression line. They should be shown how a regression line is drawn and how it is used to make predictions.

QUESTION 2: DATA HANDLING

Common errors and misconceptions

- (a) Candidates were not careful when capturing the data into their calculators. This led to incorrect answers for the mean and standard deviation.
- (b) In Q2.4 some candidates calculated the limits as $\sigma_x \pm \overline{x}$ instead of $\overline{x} \pm \sigma_x$.
- (c) Many candidates were unable to interpret each of the given statements in Q2.5. Further, they were unable to make a connection between the statements and the information provided in the graph. This led to candidates guessing the answer.

- (a) Practise calculator skills with learners. When calculating the standard deviation, the population standard deviation (σ_x) should be used and not the sample standard deviation (s_x) .
- (b) The understanding of statistical terminology is developed by using these terms frequently in the class. The use of diagrams when explaining the concepts of standard deviation and deviation intervals from the mean, should help learners in understanding these concepts.
- (c) Graphs are 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) In Q3.1 some candidates made an incorrect substitution into the gradient formula, e.g. $m_{WP} = \frac{4-4}{-4-0}.$
- (b) The equation of the straight line ST was given. Notwithstanding this, some candidates could not identify the gradient of ST in answering Q3.2. Instead of proving that ST was perpendicular to WP, these candidates assumed that WP was perpendicular to ST and then went on to calculate the gradient of ST.
- (c) In answering Q3.3 some candidates had difficulty in rewriting the equation 5y + 2x + 60 = 0 in *y*-form. Instead of solving a set of simultaneous equations to calculate the values of *x* and *y*, some candidates created the equation $5y + 2x + 60 = \frac{1}{2}x + 6$ and then went on to calculate the *x* and *y*-intercepts of this function. Some candidates incorrectly assumed that SP was parallel to the *x*-axis and therefore the *y*-coordinate of S was -4. They then substituted this *y*-value into the equation 5y + 2x + 60 = 0 to obtain the *x*-value of -20. Hence they arrived at the coordinates of S to be (-20; -4).
- (d) Candidates could not identify the *x*-coordinate of the point R. Hence they could not calculate the length of WR.
- (e) In Q3.5 many candidates were unable to use the formula $\tan \theta = m$ correctly. They either used incorrect angles or incorrect gradients in the formula. Some candidates referred to all angles in their calculations as θ . This lead to major confusion.
- (f) In answering Q3.6, many candidates adopted the strategy of calculating the area of a triangle. However, they used the formula: area of triangle = $\frac{1}{2}base \times height$ even though

the perpendicular height of the triangle was unknown. They substituted the length of a side of the triangle as the perpendicular height.

- (a) If learners are not sure, they should consult the information sheet for the correct formula.
- (b) Substitution into the formula remains a problem. Learners should first write down the coordinates and then substitute them into the formula.
- (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. The order of substitution must be consistent, especially when using the gradient 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) Candidates must be made aware that when the questions say 'show that', the answer is already there. Their task is to prove that the statement is true.
- (f) To answer questions in analytical geometry well, learners should master the properties of quadrilaterals and triangles. Constant revision of Analytical Geometry concepts taught in Grades 10 and 11 is essential, as much of the Grade 12 work revolves around these concepts.
- (g) 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.
- (h) 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 were unable to calculate the value of r^2 correctly when answering Q4.1. Many would calculate the value of *r* in the following manner $\sqrt{3^2 + 4^2} = 5$ and then write the equation of the circle as $x^2 + y^2 = 5$ instead of $x^2 + y^2 = 25$.
- (b) In Q4.2 a number of candidates were unable to establish the radius of the bigger circle. Instead, they incorrectly used the radius of the smaller circle in their answer: $(x+3)^2 + (y-4)^2 = 25$.
- (c) In answering Q4.3, some candidates used the gradient of OM instead of the gradient of MN to determine the equation of the line. Others could not correctly relate the gradient of OM to the gradient of MN.
- (d) Candidates were unable to establish the value of p or the coordinates of S. Instead they incorrectly made assumptions about these values when answering Q4.4. Some candidates wrote down a positive value for p despite the point being in the third quadrant. Others incorrectly assumed that the coordinates of S were (-3; 4).
- (e) Some candidates were unable to interpret Q4.5 correctly. They incorrectly assumed that the centres of the circles were points O and M and hence calculated the length of OM unnecessarily. Many candidates could calculate the distance between the centres, B and M, to be $\sqrt{2}$ but they were unable to use this information to calculate the values of *k*.

- (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, particularly 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 are taught how to 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 are 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 some candidates gave the answer: period of *f* is $\frac{1}{2}$. These candidates confused amplitude with period. Some candidates gave the answer as an interval, e.g. $(0^0; 360^0)$. These candidates did not understand the difference between period and domain.
- (b) A number of candidates wrote the amplitude as $-\frac{1}{2}$ instead of $\frac{1}{2}$.
- (c) In answering Q5.3, most candidates were unable to read off values from the graph correctly. Some gave the following incorrect answer:

$$f(180^{\circ}) - g(180^{\circ})$$
$$= \frac{1}{2} - \frac{1}{2}$$
$$= 0$$

(d) Many candidates did not use the information provided in the graphs to answer Q5.4.1. Instead, they tried to solve the equation $f(x-10^{\circ}) = g(x-10^{\circ})$. They arrived at

 $-\frac{1}{2}\cos(x-10^{\circ}) = \sin[(x-10^{\circ})+30^{\circ}]$ and could not proceed any further. Some

candidates incorrectly assumed that the graphs would shift to the left instead of right.

(e) Many candidates did not attempt Q5.4.2. They did not see the link between the question and the graphs that were given.

- (a) Learners should be told that the period of a trigonometric function is the length of a function's cycle. Since this value is a length, it is a single number and not an interval of values.
- (b) The amplitude of a trigonometric function is half the distance from the highest point of the curve to the bottom point of the curve: Amplitude = $\frac{\text{maximum} \text{minimum}}{2}$. Since amplitude is a distance, the answer cannot be negative.
- (c) Learners should be taught the meaning of functional notation. f(a) is the value of y and is calculated by substituting x = a into the equation of f. When a graph is given, the value of y can be read at a point where the vertical line x = a meets the graph. Therefore, the point (a; f(a)) will lie on the graph f.

- (d) Teachers need to draw similarities between the horizontal translations of algebraic functions and trigonometric functions. If given h(x) = f(x+30), then we understand that graph *f* is translated 30 units to the left. Therefore, if given $h(x) = \sin(x+30)$, then this should be interpreted as the graph of $y = \sin x$ being shifted 30° to the left. Likewise, $f(x) = \sin(x-10^\circ)$ should be interpreted as the graph of $y = \sin x$ being shifted 10° to the right.
- (e) Learners should be advised on how to look for clues in the higher-order questions. Learners must practice at making the link between unfamiliar expressions and the given information. One such skill is to be able to translate efficiently between the compound angle form and the expansion and vice-versa.

QUESTION 6: TRIGONOMETRY

Common errors and misconceptions

- (a) In Q6.1.1 some candidates were unable to correctly write the ratio for $\tan \theta$ using the coordinates of P. They wrote $\tan \theta = -\frac{5}{12}$ instead of $\tan \theta = -\frac{12}{5}$.
- (b) Poor calculator skills resulted in some candidates obtaining the incorrect value of *r* in Q6.1.2. Candidates entered the LHS of the statement $-5^2 + 12^2 = r^2$ exactly as it was written. The calculator returned a value of 119 for r^2 .
- (c) In answering Q6.1.3, some candidates incorrectly assumed that PS was parallel to the *y*-axis and therefore let a = -5. They then used $(-5)^2 + b^2 = 6, 5^2$ to calculate the value of *b*. When calculating the value of *b*, candidates defied the instruction of not using a calculator.
- (d) Incorrect simplification led to candidates not arriving at the correct answer for Q6.2. Some examples of incorrect simplification are: $\frac{2 \sin x \cdot \cos x + \cos x (-\sin x)}{-\sin x}$ and

 $\frac{2\sin x \cdot \cos x + \cos x - \sin x}{-\sin x}$. Other candidates did not apply the distributive law correctly when multiplying $(2\cos^2 x - 1)(-\sin x)$. Their answer was $-2\cos^2 x \sin x - 1$ instead of $-2\cos^2 x \sin x + \sin x$.

(e) Poor knowledge of identities and incorrect simplification hampered any chance of candidates arriving at the correct answer in Q6.3. The following errors were noted:

$$-6\cos^{2} x + 7\cos x = 3$$

$$\cos x(-6\cos x + 7) = 3$$

$$\cos x = 3 \text{ or } -6\cos x + 7 = 3$$

$$6\sin^{2} x + 7\cos x = 2 = 0$$

and

$$6\sin^{2} x + 7\cos x - 3 = 0$$

$$6\sin^{2} x + 7[\sin(90^{0} - x)] - 3 = 0$$

$$6\sin^{2} x + 7\sin 90^{0} - 7\sin x - 3 = 0$$

$$6\sin^{2} x + 7 - 7\sin x - 3 = 0$$

(f) In answering Q6.4, many candidates could not square a binomial correctly. A common

 $\langle \rangle$

incorrect response was:

$$\left(x+\frac{1}{x}\right) = x^2 + \frac{1}{x^2}$$
$$9\cos^2 A = x^2 + \frac{1}{x^2}$$
$$9\cos^2 A = 2$$

Suggestions for improvement

- (a) Learners find it difficult to recall the Trigonometry taught in Grades 10 and 11. Revision of this work must be ongoing. It is better to revise small sections of work at a time than to give learners a comprehensive revision task.
- (b) Remind learners that the same simplification skills used in Algebra also apply to Trigonometry. Regular practice can remediate the poor algebraic and manipulation skills.
- (c) The key to solving trigonometric equations lies in understanding in which quadrants a trigonometric function is positive or negative. Also, it must be stated that $k \in Z$ in the general solution. It is advisable that learners be shown the graphical solution of trigonometric equations alongside the algebraic approach.

QUESTION 7: TRIGONOMETRY

Common errors and misconceptions

- (a) In Q7.1 some candidates were unable to perform simple manipulation correctly: $\tan 30^{\circ} = \frac{\sqrt{3}r}{QS}$ was rewritten as $\tan 30^{\circ} = \frac{QS}{\sqrt{3}r}$.
- (b) Instead of giving the area of the circular region, some candidates calculated the area of $\triangle QRS$. This was not required.
- (c) Many candidates were not aware that they needed to use the cosine formula to answer Q7.3. Some candidates did not use brackets when they substituted into the cosine formula. This led to incorrect simplification. $RS^2 = r^2 + 3r^2 2r \times 3r \cos 2x$ was simplified to $4r^2 6r^2 \cos 2x$.
- (d) Many candidates substituted the correct values but then made calculation errors in Q7.4.

- (a) A careful analysis of the information that is given will give learners some idea of the concepts required in solving a triangle.
- (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 them 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 (a) some candidates assumed that $\hat{Q}_2 = \hat{K}_1$ because these angles appeared to be in the same segment. It was incorrect to assume that KPNO was a cyclic quadrilateral.
- (b) Some candidates incorrectly assumed that $\hat{M}_2 = 90^\circ$. Other candidates were unable to provide the correct reason for the statement $\hat{M}_2 = 90^\circ$. They wrote 'line from centre to midpoint' or just 'perpendicular lines'. Neither of these was accepted.
- (c) Some candidates made the following incorrect assumptions when answering Q8.1.2: $\hat{K}_2 = \hat{K}_1$ (as if it was given information), ON || KP and OP \perp . KN. Some candidates incorrectly stated that $\hat{P} = \hat{O}_1$. These candidates assumed that these angles were opposite sides of equal length.
- (d) In Q8.2.1 many candidates made the incorrect assumption that FG || BC. Using this information, they would conclude that $\hat{B} = \hat{F}_1$ because the corresponding angles were equal. Other candidates made unnecessary constructions and wanted to prove the proportionality theorem. Some candidates could not provide a valid reason as to why FG was parallel to BC.
- (e) Candidates were unable to state the correct proportion in Q8.2.2. Those who could identify the correct proportion were unable to simplify correctly.

$$7x + 63 = 10x - 30$$

-7x + 10x = -30 + 63

Candidates failed to provide a reason for the proportion that they wrote.

- (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 should be told not to make assumptions based on what they see in the diagram. They should be reminded that the diagrams are not drawn to scale.
- (d) 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.

(e) Learners should know that writing a correct statement and reason does not guarantee marks. They will only get marks if that statement and reason leads to the solution.

QUESTION 9: EUCLIDEAN GEOMETRY

Common errors and misconceptions

- (a) In answering Q9.1, some candidates either did not do the construction correctly or they failed to do the construction altogether. Other candidates attempted to use more than one method to prove this theorem but did not reach a conclusion through any method.
- (b) In Q9.2.1 many candidates did not provide a correct or complete reason for their statements.
- (c) Instead of using the proportionality theorem to answer Q9.2.2, candidates attempted to use similar triangles to find the ratios. Some incorrectly assumed that S was the centre of the circle and that MNPQ was a square. From these assumptions, they then stated that there were a number of sides that were equal in length.

Suggestions for improvement

- (a) Learners should be taught that a construction is required in order to prove a theorem. If the construction is not shown, then the proof is regarded as a breakdown and they get no marks. Teachers should test theory in short tests and assignments.
- (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 problem.
- (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

- (a) Some candidates assumed that FBDM was a cyclic quadrilateral instead of proving that it was. Many candidates did not provide the correct reason when concluding why FBDM was a cyclic quadrilateral. A common error was 'opp \angle s of a cyclic quad'.
- (b) In Q10.1.2 some candidates did not use the knowledge that FBDM was a cyclic quadrilateral. They incorrectly assumed that AM was a tangent to the circle FBDM. Some candidates referred to the incorrect angle at point B. They considered the entire \hat{B} instead of \hat{B}_1 ; \hat{B}_2 or \hat{B}_3 .
- (c) When answering Q10.1.3, some candidates attempted to prove that the triangles were congruent instead of trying to prove them similar. Some candidates were able to identify the equal pairs of angles but could not provide the correct reasons for them

being equal. Other candidates could not name the angles correctly. They would state that $\hat{B} = \hat{E}$ instead of $\hat{B}_1 = \hat{E}$ and that $\hat{D} = \hat{B}$ instead of $\hat{D}_1 = C\hat{B}E$.

- (d) In Q10.2.1 many candidates could not establish the correct proportion from Q10.1.3. They incorrectly assumed that EC = DE and some candidates substituted BC = DE – CD
- (e) Many candidates did not attempt Q10.2.2. Of those who did, some were able to establish the correct proportion but could not proceed any further.

- (a) More time needs to be spent on the teaching of Euclidean Geometry in all grades. More practice on Grade 11 and 12 Euclidean geometry will help learners to learn theorems and diagram analysis. They should carefully read the given information without making any assumptions. This work covered in class must include different activities and all levels of taxonomy.
- (b) Teachers should require learners to make use of the diagrams in the answer book to indicate angles and sides that are equal and record information that has been calculated.
- (c) Learners need to be made aware that writing correct but irrelevant statements will not earn them any marks in an examination.
- (d) Learners need to be exposed to questions in Euclidean Geometry that include the theorems and the converses. When proving that a quadrilateral is cyclic, no circle terminology may be used when referring to the quadrilateral.

CHAPTER 11

PHYSICAL SCIENCES

The following report should be read in conjunction with the Physical Sciences question papers of the November 2020 examination.

11.1 PERFORMANCE TRENDS (2016–2020)

The number of candidates who wrote the Physical Sciences examination in 2020 increased by 9 832 in comparison to that of 2019. The performance of the candidates in 2020 reflects a tremendous decline at the 30% level from 75,5% in 2019 to 65,8% and at the 40% level from 51,7% in 2019 to 42,4%.

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
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
2020	174 310	114 758	65,8	73 982	42,4

Table 11.1.1 Overall achievement rates in Physical Sciences

The questions in Paper 1 on the Doppler Effect, Electrostatics, Electrodynamics and the Photoelectric Effect were generally well answered. Performance pertaining to Organic Chemistry in Paper 2 was good. The questions on reaction rate and acids and bases in Paper 2 were very poorly answered.

Questions pertaining to pure recall of content were very poorly answered because key words 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*.

Interpretation of graphs is still 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 application of mathematical principles is still a challenge for many learners and could have contributed to a decline in performance in 2020. Learners should be given a variety of problemsolving activities that involve mathematical knowledge pertaining to simultaneous equations, quadratic equations, binomials, factorisation, trigonometry and graphs in classwork, homework, tests and examinations.



Graph 11.1.1 Overall achievement rates in Physical Sciences (percentage)

Graph 11.1.2 Performance distribution curves in Physical Sciences (percentage)



11.2 OVERVIEW OF LEARNER PERFORMANCE IN PAPER 1

General comments

- (a) The questions on Doppler Effect, Electrostatics, Electrodynamics and the Photoelectric Effect (Q6, Q7, Q9, and Q10) were generally well answered.
- (b) In many questions, learners are making the same errors and are displaying the same poor conceptual understanding as in previous years. Provinces should mediate the effective implementation of the recommendations in this diagnostic report.
- (c) Questions pertaining to pure recall of content were very poorly answered because key words 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 the drawing and labelling of free-body diagrams. This skill is central to solving problems involving forces acting on objects such as in Q2 and Q5. 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) 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.
- (g) 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.
- (h) Some learners use correct formulae and substitute correctly but fail to get the correct final answer. It is necessary for teachers to spend some time to ensure that learners know how to operate their calculators. Learners should be encouraged to use the same calculators that they have been using during the year when they sit for their examination.

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 performance per question in Paper 1

Q	Topic/s
1	Multiple choice questions - all topics
2	Newton's laws of motion
3	Vertical projectile motion
4	Momentum
5	Work, energy and power
6	Doppler effect
7	Electrostatics (Coulomb's law & electric fields)
8	Electric circuits
9	Electrodynamics: Motors, generators and alternating current
10	Photoelectric effect

There was an improvement in performance in four topics, viz. Doppler effect (Q6), Electrostatics (Q7), Electrodynamics (Q9) and Photoelectric Effect (Q10), as compared to 2019.



Graph 11.3.2 Average performance per sub-question in Paper 1

Sub-	Торіс	Sub-	Торіс	Sub-	Торіс
question		question		question	
1.1	Newton's 2 nd Law	5.3	Calculating the height h	8.3	Calculating the reading
1.2	Gravitational		indicated in the diagram		on the ammeter, the
	acceleration	5.4	Calculating the power		total external resistance
1.3	Free fall		delivered by the engine		and emf of the battery
1.4	Change in momentum	6.1	Definition of the	8.4	Explaining whether the
1.5	Work		Doppler Effect		given statement is
1.6	Doppler Effect	6.2	Interpreting the		correct
1.7	Conservation of charge		direction of motion of	8.5	How the removal of a
1.8	AC Theory		the train		resistor from the circuit
1.9	Electric circuits	6.3	Calculating the speed		attects the emf of the
1.10	Photoelectric current		of the train		battery
2.1	Definition of the normal	6.4	Calculating the time	9.1	Electrical Machine,
	force		indicated on the graph		energy conversion,
2.2	Drawing a free-body	7.1	Calculating the number		direction of rotation of
	diagram	L	of excess electrons		the soil
2.3	Calculation of the	7.2	Calculating the	0.2	Defining rms voltage
	combined mass using		magnitude of the	9.2	calculation of the
	Newton's 2 nd Law	7.0	electrostatic force		resistance and energy
2.4	Effect on the tension in	1.3	Description of an		dissipated by the
	the string and the	7.4			device
	velocity of the 20 kg	1.4	calculating the	10.1	Identifying the
	DIOCK		electric field		phenomenon displayed
3.1	Definition of free fall	7.5	Identifying the nature of		by the graph
3.2	Interpreting the graph	1.5	the charge	10.2	Naming the physical
	of bouncing object	7.6	Calculating the		quantity indicated on
4.1	Definition of momentum	1.0	magnitude of the		the graph
4.2	Calculating the velocity		charge	10.3	Identifying metal with
	of the ball after collision	8.1	Definition of the emf of		largest wavelength
	the collision		a battery	10.4	Definition of the work
5.1		8.2	Providing a reason why		function
5.1	conservative force		the voltmeter reading	10.5	Calculating the work
5.2	Colculate the change in		decreases		function and frequency
5.2	kinetic energy				of the incident light

11.4 ANALYSIS OF LEARNER PERFORMANCE IN EACH QUESTION IN PAPER 1

QUESTION 1 MULTIPLE CHOICE

Common errors and misconceptions

- (a) In Q1.1 many candidates did not recognise Newton's 2nd law in terms of momentum.
- (b) In Q1.2 many candidates did not understand the mathematical relationship between the physical quantities in the equation for gravitational acceleration.
- (c) In Q1.3 candidates experienced difficulty in interpreting the acceleration-time graph for an object in free-fall.
- (d) Candidates failed to relate the direction of F_{net} to the direction of the impulse which is equal to the change in momentum in Q1.4. Candidates failed to understand that the change in momentum (Δp) has a direction.
- (e) Candidates lacked an understanding of the basic concept of the Doppler Effect in Q1.6 i.e. The Doppler effect is not observed when there is no relative motion between the source and the observer.
- (f) Some candidates failed to realise in Q1.8 that each completed wave has two peak values, one with a positive amplitude and the other with a negative amplitude.

- (a) Multiple choice questions test learners understanding of concepts, principles, laws and the relationship between the dependent, independent and constant variables. This 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 the making of predictions.
- (b) Learners must also be encouraged to refer to the formula sheet because it gives the summaries of laws and principles as well as the relationship between the variables.
- (c) Teachers must include the use of ICT in the teaching of the subject. Multimedia/software such as *PhET* and *Edukite* as well as YouTube videos should be used to demonstrate the answers for multiple choice questions through simulations (virtual experiments).
- (d) It is recommended that a booklet containing multiple choice questions from different topics from different sources such as previous NSC and provincial papers and text books be prepared. The booklet should also have a step-by-step explanation of how to answer multiple-choice questions.

QUESTION 2 NEWTON'S LAWS OF MOTION

Common errors and misconceptions

- (a) In Q2.1 candidates omitted key words in their definition. Some misconceptions about the normal force were:
 - Force that opposes gravitational force
 - Normal is the same as weight and perpendicular to the surface.
- (b) Many candidates labelled their free-body diagram incorrectly, also omitted arrows and labels in the free-body diagrams and drew forces that were not in contact with the body.
- (c) Some candidates failed to realise that $F_{net} = 0$ at constant velocity due to the fact that acceleration equals zero.

Suggestions for improvement

- (a) Teachers should stick to and emphasise the definitions in the *Examination Guidelines* and *CAPS*. Key words 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. A method of solving simultaneous equations can be used to solve for the unknown in the equation and this method should be taught thoroughly in class. Encourage learners to use different problem-solving strategies to solve the same problem to ensure that they gain a greater understanding of the problem and their solutions.
- (c) Furthermore, learners should also be taught to understand the relationship between the equations obtained from the free-body diagrams and the equations obtained using the system approach.
- (d) 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.
- (e) Learners must be systematically exposed to different questions in which trigonometric relations must be applied.

QUESTION 3 VERTICAL PROJECTILE MOTION

- (a) Some candidates omitted the keywords 'only force' and 'gravitational force' in their definition of free fall. Some gave the definition of a projectile.
- (b) The candidates experienced problems with the signs of velocity and acceleration in their substitutions into the appropriate equations of motion.
- (c) Many candidates could not interpret the graphs properly and showed a poor understanding of the concept of time symmetry in vertical projectile motion.
- (d) Some candidates used 'sec' as the unit for time instead of 's'.

Suggestions for improvement

- (a) Learners must be advised to start every calculation in mechanics, including vertical projectile motion, by indicating the sign convention at the beginning of the problem. Emphasise that the direction of gravitational acceleration does not change in a question but remains constant. Learners should be advised to keep to ONE sign convention when solving a problem and not to change their chosen sign convention within a problem as this could lead to confusion.
- (b) Teach learners skills of interpreting graphs especially for projectiles, e.g. to have reference points and collect all relevant data before calculating any quantity.
- (c) The correct SI unit for time should be emphasised to learners.

QUESTION 4 MOMENTUM AND IMPULSE

Common errors and misconceptions

- (a) In Q4.1 some candidates wrote the definition for the law of conservation of linear momentum. Some used the term speed instead of velocity whilst some omitted the word 'product' and also used the term 'rate'.
- (b) Many candidates erroneously used the formula $\Sigma E_{ki} = \Sigma E_{kf}$ instead of $\Sigma p_i = \Sigma p_f$ or $F_{net}\Delta t = m\Delta v$ in Q4.2.1.

Suggestions for improvement

- (a) Expose learners to many different scenarios or problems that include the application of Newton's 3rd Law, the principle of conservation of linear momentum and the impulsemomentum theorem. Teachers should also integrate topics (as and when necessary) in addition to teaching each topic in isolation. Moreover, they should expose learners to problems that integrate the application of different concepts.
- (b) Teach learners to 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 with a clear focus on their vector nature.

QUESTION 5 WORK, ENERGY AND POWER

- (a) Some candidates could not properly define non-conservative force while some omitted key words in their definition e.g. omitting the word 'work'.
- (b) Many candidates applied the principle of conservation of mechanical energy even though it was not an isolated/closed system.
- (c) Some candidates calculated ΔK using the formula $\Delta K = \frac{1}{2} m(v_f v_i)^2$ instead of $\Delta K = \frac{1}{2} m(v_f^2 v_i^2)$.
- (d) Candidates also treated energy as a vector quantity by interpreting the '-' in '-1 200J' to mean direction and therefore interpreting "-1 200J" as "1200 J" in an indicated direction.

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 for 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: $W_{net} = \Delta K$, $W_{nc} = \Delta U + \Delta K$, $W_g = -\Delta U$.

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 determine how many forces are causing the net work to be done. Emphasise that Δ implies: final – initial.

QUESTION 6 DOPPLER EFFECT

Common errors and misconceptions

- (a) Many candidates could not interpret the values from the graph. They mixed up the frequencies for the observer moving towards the source and away from the source.
- (b) Several candidates used the equation $v = f\lambda$ to calculate the frequency and then find its period while some simply used the equation $T = \frac{1}{f}$ to calculate the value of time t₁.

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 $T = \frac{1}{f}$
- (c) Teachers must emphasise the progression of knowledge since the work done in Grade 12 cannot be seen in isolation from work done in Grade 10 and Grade 11.

QUESTION 7 ELECTROSTATICS (COULOMB'S LAW and ELECTRIC FIELDS)

- (a) Candidates defined the 'electric field at a point' instead of describing an 'electric field'.
- (b) Candidates also confused Coulomb's Law with Newton's Law of Universal Gravitation.
- (c) Candidates swopped/mixed the formulae for E and F as follows: $F = k \frac{Q}{r^2}$ and $E = k \frac{Q_1 Q_2}{r^2}$.
- (d) 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 to learners that calculations of net electrostatic force and electric field are similar in terms of their vector considerations.
- (b) Teachers need to clarify the distinction between the two equations i.e. $E = \frac{F}{q}$ and $E = \frac{kQ}{r^2}$ and explain to learners what charge the 'q' in $E = \frac{F}{q}$ represents and what charge the 'Q' in $E = \frac{kQ}{r^2}$ represents.
- (c) Expose learners to vector diagrams (1D and 2D) and vector triangles when working with forces (electrostatic and / or gravitational when determining the resultant of forces acting on a body) and net electric fields. Emphasise the integration of these concepts. Learners need more practise on 2D vector problems as they seem to be more comfortable and perform better in the 1D than the 2D problems.

QUESTION 8 ELECTRIC CIRCUITS

Common errors and misconceptions

- (a) Many candidates were not scientifically correct in defining the emf of a battery as key words were omitted in their definitions. Some defined emf as 'the voltage of a battery when there is no flow of current in the circuit' or 'when the circuit is open'.
- (b) Many candidates had difficulty in explaining why the terminal voltage drops when the current flows through the battery with internal resistance, as well as applying the relevant principles of resistors in parallel.
- (c) Calculating R_{ext} in one step starting off with the wrong statement:

For example:
$$R_{ext} = \frac{1}{R_1} + \frac{1}{R_2} + R_s$$

Suggestions for improvement

- (a) Although the principles of series and parallel circuits are taught from Grade 9, the basic principles should be revisited and practiced constantly. The critical features of series and parallel circuits with and without internal resistance must be emphasised.
- (b) Use *PhET* simulations to demonstrate the relationship between V_{ext} and V_{int} and the effect of adding resistors in series and parallel can also be demonstrated.

QUESTION 9 ELECTRODYNAMICS

- (a) Many candidates had difficulty in defining the term 'rms voltage'.
- (b) Many candidates still omit the subscripts 'rms' and 'ave' in the equations $P_{ave} = V_{rms}I_{rms}$,

$$P_{ave} = I_{rms}^2 R$$
 and $P_{ave} = \frac{V_{rms}^2}{R}$.

(c) Several candidates failed to recognise that the given voltage of the device was the rms voltage.

Suggestions for improvement

- (a) The Grade 11 work on electromagnetic induction must be revised in Grade 12 when motors and generators are discussed.
- (b) Emphasis should be placed on the use of subscripts in the formulae when rms calculations are done.
- (c) The differences and similarities between V_{rms} and V_{max}, I_{rms} and I_{max}, P_{ave} and P_{max} must be explained clearly and sufficient application type questions must be given to learners.
- (d) *Khan Academy*, *PhET* and *Edukite* are also very useful resources for teachers especially for topics that have a lot practical aspects.

QUESTION 10 PHOTO-ELECTRIC EFFECT

Common errors and misconceptions

- (a) Many candidates could not relate the straight-line graph to the equation: $E_{k(max)} = hf + W_o$ which indicates that the y-intercept is the work function, W_o .
- (b) Candidates failed to realise that the incident light with the largest wavelength corresponds to the incident light with the lowest frequency.
- (c) In Q10.4 many candidates omitted the word 'minimum' in the definition of the term work function. Important concepts are not clearly understood e.g. work function, threshold frequency and threshold wavelength.
- (d) Many candidates omitted the subscript 'max' in the equation: $E = W_0 + E_{k(max)}$. Errors were made by not squaring 'v' and using the wrong value for the mass of the electron even though its value was given in the data sheet.

- (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 in both classwork and homework.
- (c) Questions on new situations where interpretation of graphs is required should be compiled and provided to the learners on the 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) As in previous years performance pertaining to Organic Chemistry (Q2,Q3, Q4) was good.
- (b) The performance in the question pertaining to electrolytic cells (Q9) improved from previous years.
- (c) The questions on reaction rate (Q5) and acids and bases (Q7) were very poorly answered. The concept of hydrolysis (Q7.1.4) is poorly understood and was one of the poorest answered sub-questions in the paper.
- (d) Many candidates struggled to use their calculators correctly and failed to get the correct answer when calculating the acid concentration from the pH (Q7) and when performing calculations where small numbers are written in scientific notation (Q6).
- (e) From the performance in Q5 it is evident that practical skills did not receive much attention in 2020. Candidates could not identify dependent and independent variables and experienced difficulty in interpreting the given graph.
- (f) The writing of definitions correctly is a challenge to many candidates. Key words were often omitted or words in definitions were replaced with their own wording or explanations, resulting in partially correct definitions.
- (g) Most candidates did not know how to use the table of *Standard Reduction Potentials* correctly which caused the poor performance in some of the sub-questions in Q8 and Q9.
- (h) Rounding off answers to two decimal places in each step of a multistep calculation led to some candidates obtaining final answers that were different from the accepted ranges in those questions. Rounding off to two decimal places should only be done in the final answer to a sub-question.
- (i) There is still a high percentage of candidates who performed poorly due to common consistent mistakes that can be avoided if they prepare well for the examination. These mistakes have no bearing on the difficulty level or the content tested. Many candidates lost valuable marks due to these avoidable errors. This must be resolved through proper teaching and learning.

Examples of mistakes are:

- Incorrect numbering of questions
- In calculations, using values incorrectly copied from the question paper
- Incorrect copying of formulae from the data sheet
- Substituting values different from those supplied on the periodic table or constant tables
- No units provided in final answers
- Leaving final answers as fractions
- Omitting H atoms and/or bond lines when drawing structural formulae of organic compounds.

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 performance per question in Paper 2

Q	Topic/s				
1	Multiple-choice questions				
2	Organic nomenclature				
3	Physical properties of organic compounds				
4	Organic reactions				
5	Reaction rate and stoichiometry				
6	Chemical equilibrium				
7	Acids and bases and stoichiometry				
8	Galvanic cells				
9	Electrolytic cells				
10	Fertilisers				

Performance improved in only four questions, namely nomenclature of organic compounds (Q2), physical properties of organic compounds (Q3), chemical equilibrium (Q6) and electrolytic cells (Q9), as compared to 2019. Whilst there was a significant improvement in the performance of Q9 (electrolytic cells), the performance in Q5 (rate of reaction) showed a decline of more than 10%.



Graph 11.6.2 Average performance per sub-question in Paper 2

Sub-	Торіс			
question				
1.1	General formulae			
1.2	Empirical formulae			
1.3	Structural formulae			
1.4	Factors affecting reaction rate			
1.5	Role of a catalyst			
1.6	pH and application of Le Chatelier's principle			
1.7	Conjugate acid-base pairs			
1.8	Redox reaction			
1.9	Electrolytic cells			
1.10	Eutrophication			
2.1	Homologous series' and IUPAC names			
2.2	IUPAC names and structural formulae			
2.3	Primary alcohols and esterification			
3.1	Boiling point			
3.2	Functional groups			
3.3	Boiling points vs number of C atoms			
3.4	Boiling point vs functional groups			
3.5	Boiling point vs functional groups			
3.6	Vapour pressure and boiling point			
4.1	Halogenation			
4.2	Organic reactions			
4.3	Organic reactions			
4.4	Organic reactions			
4.5	Hydrolysis reaction			
5.1	Identification of variables			
5.2	Interpretation of a graph			
5.3	Calculation of average rate			

Sub-	Торіс			
question				
5.4	Interpretation of data in a table and			
	on a graph			
5.5	Collision theory			
5.6	Stoichiometric calculation			
6.1	Reversible reaction			
6.2	Effect of change in pressure on K_c			
	and the equilibrium position			
6.3	Explanation in terms of Le			
	Chatelier's principle			
6.4	Explanation in terms of Le			
	Chatelier's principle			
6.5	K _c calculation			
7.1	Weak acid; pH calculation;			
	hydrolysis of a salt			
7.2	Stoichiometric calculation			
8.1	Functions of a salt bridge			
8.2	Anodes			
8.3	Anode in a galvanic cell			
8.4	Reduction half-reaction and			
	reducing agent			
8.5	Cell potential			
8.6	Explanation in terms of relative			
	strengths of recuing agents			
9.1	Electrolysis			
9.2	Electrolytic cell			
9.3	Electrolytic cell			
9.4	Change in concentration in an			
	electrolytic cell			
9.5	Half-reaction in an electrolytic cell			
10.1	Fertilisers			
10.2	NPK			

11.7 ANALYSIS OF LEARNER PERFORMANCE IN EACH QUESTION IN PAPER 2

QUESTION 1: MULTIPLE-CHOICE QUESTIONS

Common errors and misconceptions

- (a) In Q1.1 the most common incorrect answer was *A*, which represents the general formula for alkenes.
- (b) In Q1.2 most candidates incorrectly chose the molecular formula of hexanoic acid as the answer and did not determine its empirical formula, possibly because they did not know what an empirical formula was.
- (c) The most common incorrect answer in Q1.3 was *A*, which represents the structural formula of a carboxylic acid (the only distractor which is NOT an ester)
- (d) Most candidates did not know that volume will not affect the reaction rate (Q1.4). Many chose *A* as the answer, possibly reasoning that a smaller volume has a larger concentration and therefore resulting in a higher reaction rate.
- (e) Q1.5 was the best answered sub-question. The minority who had it wrong, mainly chose *B* (activation energy) as answer.
- (f) In Q1.6 most candidates could not relate an increase in $[H^+]$ to pH to determine the effect of pH on the given equilibrium. They mainly chose A as the answer.
- (g) The most common incorrect answers in Q1.7 were A and C. Many candidates did not know that the conjugate base can be obtained by removing H^+ from the given ion.
- (h) Failure to use the *Table of Standard Reduction Potentials* correctly led to poor performance in Q1.8. Candidates could not identify the half-reactions on the table to determine the spontaneous reaction.
- (i) In Q1.9 most candidates showed poor understanding of the functioning of an electrolytic cell. Those who knew that the anode, where oxidation takes place, will show a mass decrease, did not realise that the initial mass of the anode cannot begin at 0 on graph.
- (j) Many candidates failed to differentiate between the process of eutrophication and its causes (Q1.10).

- (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 used in assessments on a regular basis for all topics covered.
- (b) Subject advisors should compile a booklet with multiple choice questions arranged according to topics to supply to schools. These questions can be used for weekly assessments. Through discussions, learners can then be shown how to approach such questions.

- (c) Although definitions from the Grade 11 section 'Quantitative aspects of Chemical Change' are not assessed in the Grade 12 examinations, applications thereof are examinable. Concepts from this section such as empirical formula, percentage composition, stoichiometric calculations and molar mass should be revised.
- (d) Learners should be taught how to determine the conjugate base or conjugate acid from a given species.

<u>Conjugate acid</u>: ADD H⁺ to the given compound or ion. Example: Conjugate acid of HPO₄²⁻: HPO₄²⁻ + H⁺ \rightarrow H₂PO₄⁻

<u>Conjugate base:</u> REMOVE H^+ from the given compound or ion. Example: Conjugate base of HPO₄²⁻: HPO₄²⁻ - $H^+ \rightarrow PO_4^{3-}$

(e) The correct use of the *Table of Standard Reduction Potentials* cannot be emphasised enough. The meaning of reduction potentials (E^{θ} 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 which 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 E^{θ} value has the greater tendency to be a reduction and the substance undergoing reduction is the stronger oxidising agent. The one with the less positive E^{θ} value has the greater tendency to be an oxidation and the substance undergoing oxidation is the stronger reducing agent.

Learners must know where on the *Table of Standard Reduction Potentials* are the oxidising agents and reducing agents and in which direction (upwards or downward) is the strength of each increasing.

The following steps can be followed to determine whether a reaction is spontaneous:

- Identify the two half-reactions that together will give the net equation, on the *Table of Standard Reduction Potentials*.
- Identify the reducing agent in each half-reaction on the table and determine which one is the stronger reducing agent.
- Identify the oxidising agent in each half-reaction on the table and determine which one is the stronger oxidising agent.
- The spontaneous reaction will be between the stronger reducing agent and the stronger oxidising agent.
- (f) Learners must be taught to differentiate between electrolytic and galvanic cells. In an electrolytic cell, the electrode connected to the positive terminal of the battery will always be the anode where oxidation takes place. When a metal is oxidised to form ions, its mass decreases. The electrode connected to the negative terminal of the battery is always the cathode where reduction takes place, resulting in an increase in mass if a solid is formed.

QUESTION 2: ORGANIC NOMENCLATURE

Common errors and misconceptions

- (a) Most candidates identified the homologous series in Q2.1.1 correctly. For some candidates spelling was a problem and *keytone* instead of *ketone* was used.
- (b) Many candidates numbered the functional group of the aldehyde (*pentan-1-al* instead of *pentanal*) in Q2.1.2 and forfeited one mark. A number of candidates did not know what a functional isomer was and failed to identify the compound as an aldehyde.
- (c) In Q2.2.1 most candidates lost a mark due to incorrect numbering and/or sequencing of substituents. Most candidates gave preference to the halogen (2-bromo-4,5-dimethylhexane instead of 5-bromo-2,3-dimethylhexane) in the haloalkane instead of treating all substituents equally and thus numbered from the side that will result in the lowest numbers.

When drawing the structural formula of the alkyne (Q2.2.2), some placed the triple bond between C1 and C2 instead of between C2 and C3. Other common errors were as follows:

- More than four bonds on the C atoms of the triple bond
- Omitting H atoms
- Using a double bond instead of a triple bond
- Using condensed structural formulae

The definition of a *primary alcohol* (Q2.3.1) was poorly answered for a recall question. Common errors were:

- One C atom is bonded to the –OH group instead of one C atom is bonded to the C atom bonded to the OH group
- Referring to the O atom instead of the -OH group e.g. in a primary alcohol, the C atom attached to the O atom is attached to only one other C atom
- Referring to the *homologous series* instead of to the *functional group* e.g. the alcohol is bonded to a C atom bonded to only one other C atom
- Referring to the *hydroxyl group* as a *hydroxide ion*.
- (d) In Q2.3.3 many candidates wrote the IUPAC name of the compound C or another ester instead of the carboxylic acid needed to prepare ester. Some of those who knew that the carboxylic acid needed is *butanoic acid*, only wrote *butanoic* and forfeited the mark.

Suggestions for improvement

(a) It should be emphasised that halogens do not get preference when naming haloalkanes. All substituents, halogens and alkyl groups should be treated as equals and numbering should be such that the substituents have the lowest numbers. For example, 2,3,5 is smaller than 2,4,5.

- (b) When writing IUPAC names:
 - The correct use of hyphens and commas should be emphasised.
 - Functional groups of aldehydes, carboxylic acids and esters are not numbered.
 - Numbering is only used for substituents when naming alkanes.
- (c) When drawing structural formulae, learners should be encouraged to count the number of bonds drawn around atoms to eliminate unnecessary errors. They need to be reminded that a carbon atom cannot have less than or more than 4 bonds around it.
- (d) Frequent informal tests should be used to ensure that learners write definitions correctly. Often, learners write different interpretations of a definition and they usually end up with incorrect or partially correct statements.
- (e) Emphasise the difference between molecular formulae, structural formulae and condensed structural formulae.

QUESTION 3: PHYSICAL PROPERTIES OF ORGANIC COMPOUNDS

Common errors and misconceptions

(a) The omission of the word *temperature* in the definition of boiling point (Q3.1) was a common error e.g. boiling point is the point where the vapour pressure of a liquid equals atmospheric pressure.

Some stated that the vapour pressure is *in equilibrium with*, instead of *equal to*, the atmospheric pressure.

Most candidates could not write the structural formula of the functional group of aldehydes in Q3.2. Common errors were:

- Omitting the fourth bond line on the carbon atom
- Drawing the structural formula of an aldehyde e.g. propanal
- Adding another C atom to the C atom of the functional group
- Using an *X* instead of a *R* to indicate an alkyl group.
- (b) In Q3.3 many candidates compared the different types of intermolecular forces in alkanes, aldehydes and alcohols when explaining the increase in boiling points as the number of C atoms increases. Other common errors were:
 - The chain increases (instead of chain length)
 - Energy needed to break the bonds (instead of intermolecular forces)
 - Energy needed to break the intermolecular forces between atoms (instead of molecules)
 - In a longer chain there are more bonds to break requiring more energy
 - More energy is needed to break the chains (instead of intermolecular forces).
- (c) The explanation in Q3.4.2 was a challenge to many candidates. Common errors were:
 - Referring to *bonds between atoms* instead of *intermolecular forces*
 - Referring to the double bond between the C atom and the O atom in aldehydes as being dipole-dipole forces or even hydrogen bonds which are stronger than the London forces in alkanes

- Comparing the types of intermolecular forces in alkanes, alcohols and aldehydes without comparing the strength of these forces
- Failure to compare the three graphs although the aldehyde was correctly identified, only two of the graphs were compared.
- (d) In Q3.5 many candidates numbered the functional group of the aldehyde and *butan-1-al* instead of *butanal*.
- (e) Most candidates did not number the position of the functional group (Q3.6) and *pentanol* instead of *pentan-1-ol* was a common incorrect answer when writing the IUPAC name of the alcohol with five C atoms. Some of those who numbered the functional group of the alcohol correctly, wrote the IUPAC name as *pent-1-ol* instead of *pentan-1-ol*.

Some did not know the relationship between boiling point and vapour pressure and thought that pentane has the lowest vapour pressure.

- (a) When discussing intermolecular forces, the concepts atoms, molecules and ions should be revised. Emphasise the difference between bonds between atoms in molecules (intramolecular) and forces between molecules (intermolecular) and that the strength of intermolecular forces are responsible for the different phases. Interatomic or intramolecular forces, which are much stronger than intermolecular forces, are formed/broken during chemical reactions when new compounds are formed. Intermolecular forces are overcome (not broken) during phase changes.
- (b) Emphasise that functional groups of carboxylic acids and aldehydes are not numbered when writing IUPAC names. In both carboxylic acids and aldehydes, the functional group is always on the first C atom and is not numbered. However, functional groups of alcohols, alkenes, alkynes and ketones should be numbered because the functional group can be on different C atoms.
- (c) Ensure that learners know the different types of intermolecular forces when comparing boiling points of compounds from different homologous series and can compare the strength of these forces.

Homologous series	Type and strength of intermolecular forces			
Alkanes Alkenes	K			
Alkynes	ΈA			
Aldehydes	3			
Ketones	sec	⊔ n		
Esters	ore	s s⊟		
Haloalkanes	ן f	N Ce P		
Alcohols Carboxylic acids	Londoi	Dipole for STRO	Hydrogen bonding STRONGEST	

QUESTION 4: REACTIONS OF ORGANIC COMPOUNDS

- (a) Although well answered, some candidates were not sure of the meaning of hydrohalogenation (Q4.1) and used substitution or elimination as key words instead of addition. Some candidates swopped the wording around and wrote that halogenation is the addition of an alkene to a hydrogen halide instead of the addition of a hydrogen halide to an alkene. Other common errors were:
 - The addition of a hydrogen and a haloalkane
 - The reaction between hydrogen and a halogen
 - The addition of water
 - The addition of water and a halogen
- (b) In Q4.2 the structural formula of propane was a common incorrect answer. Several the candidates obtained only 1 mark which was for the functional group whilst the rest of the structure was incorrect. Other common errors were:
 - Adding more than four H atoms around each C atom
 - Drawing the structural formula of ethene or but-1-ene
 - Addition of two functional groups to the structural formula, for example a halogen and a double bond or else two CI substituents
- (c) Most candidates confused cracking (Q4.3.1) with other types of elimination reactions and wrote dehydrogenation, dehydration or dehydrohalogenation.
- (d) In Q4.3.2 many candidates drew the structural formula instead of writing the molecular formula of the alkane. Such learners did not read the question properly or did not know the difference between a structural formula and a molecular formula. Some candidates gave the general formula of alkanes as answer.
- (e) When writing the IUPAC name in Q4.4, most candidates numbered incorrectly. Common incorrect answers were 2,3-dibromopropane or 1,1-dibromopropane or 2,2-dibromopropane. Other common errors were:
 - Omitting hyphens between numbers and words
 - Using a semi-colon instead of a comma between numbers
 - Omitting the *di* to indicate two bromine atoms
- (f) Many learners confused *hydrolysis* (Q4.5.1) with *hydrogenation* and therefore used H₂ as reactant to produce propane. Such learners added HCl as a second product. Others thought it was similar to hydration and obtained an alkene as a product. Other common errors were:
 - Adding extra reactants or products
 - Omitting the arrow between reactants and products
 - Adding an additional functional group to the product e.g. the -OH group as well as a CI atom
 - Writing incorrect structural formulae for inorganic reactants e.g. H₂O was written as H – H – O and NaOH as Na – O – H
- (g) In Q4.5.2 many candidates only stated that a dilute base is needed instead of a dilute strong base (or water), whilst others omitted the word dilute and only wrote strong

base. Those who thought that hydrolysis is similar to hydration or hydrogenation, stated that an acid catalyst or a catalyst should be used. For the second reaction condition, many learners referred to temperature or strong heat instead of mild heat.

Suggestions for improvement

- (a) Chemical bonding in Grade 10 and 11 should receive more attention. The valency of different elements, e.g. carbon forming only four bonds and hydrogen only one bond, should be revised.
- (b) Emphasise the difference between structural, molecular, general and empirical formulae.
- (c) Ensure that learners know that the rules applicable to the writing of balanced equations are also valid when writing balanced equations using structural formulae. Learners should also be made aware that structural formulae are required only for organic compounds and not for inorganic reactants when writing equations using structural formulae.
- (d) Learners must be exposed to more questions based on flow diagrams.
- (e) Conditions under which reactions of organic compounds occur should be emphasised.

QUESTION 5: REACTION RATE

Common errors and misconceptions

- (a) Candidates could not identify the dependent (Q5.1.1) and the independent (Q5.1.2) variables correctly. Most of them selected one of the headings of the columns in the table given, therefore *volume* and *concentration* were common incorrect answers. Others swopped the dependent and independent variables. Many thought that time (on the axis) was the independent variable.
- (b) Most candidates did not know that the gradient of the graph represented reaction rate (Q5.2.1). The increase in volume between 20 s and 40 s was interpreted as an increase in reaction rate. Although the total volume of gas was increasing, it was increasing with a smaller volume per second.
- (c) In Q5.2.2 many candidates interpreted the graph parallel to the x axis (from 60 s to 120 s) as representing a reaction that reached equilibrium. They did not know that the gradient of the graph represented reaction rate. Consequently, very few candidates concluded that the constant volume shown in the graph represented a reaction that was complete or the gradient of the graph was zero and therefore the reaction rate was zero.

Common incorrect answers were:

- The reaction reached equilibrium.
- The rate of the forward reaction equals the rate of the reverse reaction.
- Reaction rate is constant.
- (d) In Q5.3 candidates did not interpret the graph correctly and therefore did not know that the reaction takes place only for 60 s. Many calculated the average rate, substituting (120 0) as the time.

Other common errors were:

- Using an incorrect formula e.g. $n = \frac{V}{V_m}$ or $c = \frac{n}{V}$
- Substituting incorrect values from the graph e.g. $\frac{500 0}{120 60}$, $\frac{500 300}{60 20}$, $\frac{500 300}{120 60}$
- Substituting $\frac{0-500}{60-0}$ thus obtaining a negative answer
- (e) Many candidates failed to interpret the table to conclude that the reaction in experiment C will take place at a faster rate (Q5.5) and therefore the gradient of the graph will be steeper.

Although most candidates attempted the explanation in terms of the collision theory, many forfeited marks for one or more of the following reasons:

- Stating that the powder has a smaller surface area instead of a larger surface area
- Stating that the powder has a larger surface area and therefore the kinetic energy will increase
- Stating that more effective collisions take place instead of more effective collisions per unit time
- Stating that effective collisions take place per unit time instead of more effective collisions per unit time
- Omitting the last statement i.e. reaction rate will increase

Very few candidates obtained full marks for the stoichiometric calculation (Q5.6). Many candidates forfeited marks for one or more of the following errors:

- Using the molar gas volume of 25,7 dm³·mol⁻¹ given in the paper as the volume of the gas and then dividing it by 22,4 dm³·mol⁻¹
- Using the ratio between CO_2 and $HC\ell$ (1:2) instead of that between $CaCO_3$ and CO_2 (1:1)
- Using *kg* as the unit at the final answer
- Using an incorrect formula e.g. $c = \frac{m}{MV}$ and then substituting 22,4 dm³·mol⁻¹ or 25,7 dm³·mol⁻¹ as the volume of gas.

Suggestions for improvement

(a) Practical skills should receive more attention in schools. Learners have a poor understanding of skills such as identifying variables and interpreting graphs. Ensure that learners know how to distinguish between the independent variable (factor that is manipulated/changed during an experiment), the dependent variable (factor affected by the change made and that is measured) and the controlled (factors that are kept constant) variables.

Graphs such as the one in Q5 should be used to explain to learners how to analyse the different stages of a chemical reaction, for example:

- Initially, the gradient of the graph is steepest, and the reaction rate is high.
- When the gradient becomes less steep, due to reactants being used up, the reaction rate decreases.
- Finally, when the gradient becomes zero, the reaction is complete because one or more reactants are used up and the reaction rate is zero.

- (b) Emphasis should be placed on the difference between reversible and non-reversible reactions. Reversible reactions can reach equilibrium, whilst non-reversible reactions take place in one direction and cannot reach equilibrium. Furthermore, a reversible reaction can only reach equilibrium in a closed system. If gases are released it implies that the container should be closed to prevent the gases from escaping. When written, equilibrium reactions are indicated with double arrows. Single arrows indicate non-reversible reactions.
- (c) When teaching reaction rate calculations, it should be emphasised that the formula is not on the data sheet. Rate can be calculated as a change in concentration/mass/ volume/number of moles per time. Therefore, any one of the following can be used:

Determine rate in terms of products	Rate = $\frac{\Delta c}{\Delta t}$	Rate = $\frac{\Delta m}{\Delta t}$	Rate = $\frac{\Delta V}{\Delta t}$	Rate = $\frac{\Delta n}{\Delta t}$
Determine rate in terms of reactants	Rate = $-\frac{\Delta c}{\Delta t}$	Rate = $-\frac{\Delta m}{\Delta t}$	Rate = $-\frac{\Delta V}{\Delta t}$	Rate = $-\frac{\Delta n}{\Delta t}$

- (d) Ensure that learners know the different scenarios, namely change in surface area, change in temperature, change in concentration and addition of a catalyst, that should be explained in terms of the collision theory. Use previous marking guidelines to give learners assistance on how to explain each of these scenarios in terms of the collision theory.
- (e) Stoichiometry needs more attention in class. Learners struggle to use ratios correctly and are very uncertain when selecting formulae for a specific calculation.
- (f) It should be emphasised that the molar gas volume of 22,4 $dm^3 \cdot mol^{-1}$ is only applicable to STP.

QUESTION 6: CHEMICAL EQUILIBRIUM

- (a) Although this question was well answered, some candidates confused *reversible* with *reverse* (Q6.1). Many candidates seemed not to know that a reversible reaction is one in which both a forward and a reverse reaction can take place. A common incorrect answer was: 'A reaction that can be reversed or a reaction in which products react to form reactants'.
- (b) Many candidates did not know that only temperature can change the value of $K_{\rm c}$ (Q6.2.1).
- (c) In their explanation in Q6.3, many candidates stated Le Chatelier's principle instead of using it. Some stated that the reaction with the lower pressure will be favoured instead of the reaction that forms the smaller number of moles of gas. Instead of stating that the reverse reaction is favoured, many stated that the equilibrium shifts to the left.
- (d) Many candidates could not interpret the K_c values in answering Q6.4. Some thought that 5,6 x 10^{-12} is a greater K_c value than 3,76 x 10^{-3} and then deduced that K_c decreased with an increase in temperature.

When explaining why the reaction is endothermic, many candidates omitted to state that 'an increase in temperature favours an endothermic reaction' or 'a decrease in temperature favours an exothermic reaction'.

In the K_c calculation (Q6.5), many candidates used a table without fully understanding (e) how to use the table.

Common errors were:

- No K_c expression (Note: $\frac{[products]}{[reactants]}$ is NOT a K_c expression!) Incorrect K_c expression e.g. K_c = $\frac{[I_2]}{[I]^2}$ or $\frac{[21]}{[I_2]}$
- •
- Using a correct K_c expression with round brackets instead of square brackets
- Starting to complete the table without calculating $[I_2]$
- Substituting the equilibrium concentration of the iodine atoms, [I] for the equilibrium concentration of the iodine molecules $[I_2]$
- Using incorrect labels in the table e.g. equilibrium concentrations are written next to the label for equilibrium number of moles
- Substituting the molar mass of I₂ as 127 g mol⁻¹ instead of 254 g mol⁻¹

Suggestions for improvement

- Place more emphasis on explanations requiring Le Chatelier's principle. Learners (a) struggle to express themselves when explaining in terms of Le Chatelier's principle. They should be exposed to more exercises to practice such explanations.
- (b) Correct scientific language should be used in class. For example, it is better to state that the 'reverse reaction will be favoured' instead of the 'equilibrium shifts to the left'.
- When answering questions that require explanations in terms of a change in (c) temperature of an equilibrium system, the first step should be to state how the change in temperature influences either an exothermic or an endothermic reaction i.e. 'an increase in temperature favours an endothermic reaction or a decrease in temperature favours an exothermic reaction'.
- Teachers should avoid the use of $K_c = \frac{[products]}{[reactants]}$ in class. Instead, use chemical (d) equations to teach the writing of K_c expressions.
- (e) When using a table to solve K_c calculations, learners should be taught to use correct labels [n(initial), n(change), n(equilibrium), c(equilibrium)] in the table and write the correct values next to each label. Use previous marking guidelines to show learners the labelling in such tables.

QUESTION 7: ACIDS AND BASES

Common errors and misconceptions

Many candidates did not use the definition to explain why ethanoic acid is a weak acid (a) (Q7.1), but instead just stated that it is used in the house or in food or that it can be swallowed, and it is therefore a weak acid. Another common error was referring to a weak acid as an acid with a low concentration of hydronium ions. Some also referred to an acid that is incompletely dissolved instead of incompletely ionized.

(b) It was obvious that many candidates did not know how to use their calculators to calculate the concentration from the pH value (Q7.1.2). Consequently, most candidates forfeited the mark for the answer.

Other common errors were:

- Using an incorrect pH formula e.g. pH = -log[H₃O] or pH = -log(H₃O⁺) or ph = -log[H₃O⁺] or pH = -log[CH₃COOH]
- Incorrect substitution of the pH value i.e. pH = -log(3,85)
- Omitting the unit of concentration at the final answer or using an incorrect unit e.g. mol·dm³
- (c) In Q7.1.3 some candidates incorrectly indicated that the pH = 7 and then further explained incorrectly in the next question that the acid neutralises the base.
- (d) Most candidates did not attempt to write the equation in Q7.1.4 and reasoned that the solution will be basic because it is the salt of a weak acid and a strong base. Others wrote the equation for the reaction of CH₃COOH and NaOH given in Q7.2, instead of the equation for the reaction of the CH₃COO⁻ with H₂O. Candidates had a poor understanding of the term hydrolysis i.e. the reaction of a salt with water.
- (e) Most candidates substituted the data given for NaOH (Q7.2.1) in the question paper in the formula $c = \frac{n}{v}$ without any reference to CH₃COOH to obtain the final answer. There was no indication that n(CH₃COOH) = n(NaOH). Other common errors were:
 - Incorrect or no conversion from cm³ to dm³
 - Rounding off of the value given in the question paper before substitution e.g. after converting 14,5 cm³ to dm³, candidates rounded it to 0,01 or 0,015 or even 0,014 instead of using 0,0145 dm³.
- (f) In Q7.2.2 many candidates forfeited the mark for subtraction of the unreacted moles of CH₃COOH from the initial moles to determine the number of moles that have reacted. Many candidates started by calculating the n(CaCO₃) using the 1,2 g from which they determined the n(CH₃COOH). Such candidates missed several steps in the multistep calculation and obtained a maximum 3 of the 8 marks.

Other errors were:

- Incorrect calculation of the molar mass of CH₃COOH or CaCO₃
- Multiplying instead of dividing by 1,2 g when calculating the percentage of CaCO₃ in the impure sample

- (a) There is a serious need for teacher development in the content and skills needed to teach acids and bases.
- (b) Learners should be taught to copy formulae correctly from the data sheet.
- (c) Learners should be taught to label formulae when doing multistep calculations e.g. when calculating the number of moles of NaOH, the formula should be as follows: n(NaOH) = cV.

- (d) Ensure that stoichiometric calculations are properly taught in Grade 11. Expose learners to stoichiometric calculations involving limiting reagents from the beginning of their Grade 12 year to give them enough practice.
- (e) Rounding off should only be done at the final answer of a calculation. Learners should be taught not to round off in each step as it leads to an incorrect answer.
- (f) Learners should be taught to use values given in a question paper when substituting. Such values are fixed and should not be rounded before substitution.
- (g) When teaching hydrolysis, learners should be taught to split the given salt into ions and then each ion should be reacted with water. For example, when CH₃COONa undergoes hydrolysis the following steps should be followed to determine whether an acidic or basic solution will form:
 - Determine the two ions in the salt e.g. in CH₃COONa i.e. Na⁺ and CH₃COO⁻
 - The positive ion (Na⁺) comes from a base and the negative ion (CH₃COO⁻) comes from an acid. Determine the base and acid that can be used to prepare the salt, for example: CH₃COO⁻ - the acid is CH₃COOH which is a weak acid Na⁺ - the base is NaOH which is a strong base (From the above, learners can already deduce that only the CH₃COO⁻ will undergo hydrolysis as it comes from a weak acid. Na⁺ will not undergo hydrolysis as it comes from a strong base.)
 - Determine which ion will undergo hydrolysis:
 - A weak acid ionises incompletely and therefore its negative ion will hydrolyse: CH3COO– + H2O
 → CH3COOH + OH– (equilibrium position lies to right).

When the negative ion reacts with water, OH- is always one of the products. **NOTE:** CH3COOH is a weak acid and is incompletely ionised, therefore CH3COO–undergoes hydrolysis.

 A strong base dissociates completely and therefore its ion will NOT hydrolyse. If the ion reacts with water, a strong base will be the product and will immediately dissociate because a strong base is completely ionised/dissociated. The following reaction will not take place and therefore Na+ will not undergo hydrolysis.

 $Na^+ + H2O \hookrightarrow NaOH + H_3O^+$ (equilibrium position lies to the left) When the positive ion reacts with water, H3O+ is always one of the products.

After determining the ion that will undergo hydrolysis i.e. CH_3COO^- in this case, the reaction of this ion with water should be written down as the hydrolysis reaction: $CH_3COO^- + H_2O \rightarrow CH_3COOH + OH^-$

• The product of this reaction (OH⁻ or H₃O⁺) should be used to explain whether hydrolysis of the salt forms an acidic or basic solution. In this case OH⁻ is formed and therefore the solution will be basic.

QUESTION 8: REDOX REACTIONS AND GALVANIC CELLS

- (a) When stating another function of the salt bridge (Q8.1), many candidates just repeated the function given in the question paper, i.e. 'it completes the circuit'. Common misconceptions were as follows:
 - The salt bridge transfers electrons from one half-cell to the other or conducts electricity.
 - The salt bridge transfers ions from the one half-cell to the other (**NOTE:** lons do not move from one half-cell to the other. Cations move from the salt bridge to the cathode and anions move from the salt bridge to the anode).
 - The salt bridge connects the two half-cells.
 - The salt bridge separates the electrodes and prevent them from touching.
- (b) Many candidates incorrectly defined the anode (Q8.2) as the electrode that undergoes oxidation. This statement excludes anodes that are inactive electrodes and will not undergo oxidation. Some candidates confused the word *electrolyte* with *electrode* and then stated that an anode is the electrolyte where oxidation takes place.
- (c) In Q8.3 many candidates failed to use the *Table of Standard Reduction Potentials* correctly to identify the anode in the cell. Mg^{2+} , a solution, and *Pt*, an inert electrode, were common incorrect answers.
- (d) Failure to use the *Table of Standard Reduction Potentials* correctly resulted in candidates writing the oxidation half-reaction for the hydrogen half-cell (Q8.4.1) instead of the reduction half-reaction. Other common errors were:
 - Copying the reduction half-reaction with a double arrow from the *Table of Standard Reduction Potentials*
 - Writing either the reduction half-reaction (Mg²⁺ + 2e⁻ \rightarrow Mg) or the oxidation half-reaction (Mg \rightarrow Mg²⁺ + 2e⁻) for magnesium
 - Writing the platinum half-reaction: $Pt^{2+} + 2e^- \rightarrow Pt$
- (e) In Q8.4.2 many candidates wrote the formula for the oxidising agent (Mg²⁺). Some candidates wrote either the oxidation half-reaction or the reduction half-reaction for magnesium instead of the formula of the reducing agent.
- (f) When calculating cell potential (Q8.5) common errors were:
 - Using abbreviations in the formula e.g. $E_{cell} = E_{red} E_{ox}$ or $E_{cell} = E_{oxidising} E_{reducing}$
 - Swapping the reduction potential of the anode with that of the cathode when substituting
 - Substituting the reduction potential for the Pt²⁺/Pt half-reaction instead of that for the H⁺/H₂ half-reaction
- (g) In Q8.6 most candidates compared the relative strengths of Cu and Zn instead of that of H_2 and Cu. Others stated that H^* , instead of H_2 , is a stronger reducing agent than Cu²⁺, instead of Cu. Candidates failed to identify the oxidising agents and reducing agents on the *Table of Standard Reduction Potentials*.

Suggestions for improvement

- (a) Concepts such as reducing agent, oxidation, oxidising agent and reduction should be taught with understanding. Learners must be able to identify, for example the reducing agent in a reaction. Regular assessment on this identification is needed to ensure that learners fully understand these concepts and how to identify them on the *Table of Standard Reduction Potentials*.
- (b) Learners should be taught how to use the *Table of Standard Reduction Potentials* to identify the anode, cathode, reducing agent, oxidising agent, reduction half-reaction and oxidation half-reaction in a galvanic cell. Regular assessment on this identification is needed to ensure that learners understand the use of the *Table of Standard Reduction Potentials*.

QUESTION 9: ELECTROLYTIC CELLS

Common errors and misconceptions

- (a) Candidates did not know the difference between *electrolysis*, an *electrolytic cell* and an *electrolyte*. In Q9.1 many candidates wrote the definition of an electrolyte instead of the definition of electrolysis.
- (b) A common incorrect response to Q9.2 was that the absence of a salt bridge indicates that it is an electrolytic cell. Some candidates thought the coin or electrodes show that it is an electrolytic cell.
- (c) Most candidates could not identify the electrolyte in Q9.3 and wrote the formula of an insoluble silver salt or just silver (Ag). Some wrote the silver ion with a +2 charge instead of a +1 charge.

Although many candidates knew that the concentration of the electrolyte will remain constant (Q9.4), most of them failed to give a correct reason. A common incorrect response was that 'the rate of the forward reaction equals the rate of the reverse reaction'. Such candidates did not understand that the oxidation and reduction half-reactions together form the forward reaction – there is no reverse reaction in the cell. Another misconception was that the electrolyte is NOT part of the reaction (or is a spectator ion) and therefore remains the same.

(d) Most candidates wrote the reduction half-reaction for silver (Q9.5) instead of the oxidation half-reaction. They copied the half-reaction as it is written on the *Table of Standard Reduction Potentials*. Other common errors were the omission of the charge on the Ag+(aq) or the use of double arrows in the half-reaction.

- (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) 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 (Q10.1) to identify the unknown items was poorly done. In Q10.1.1 and Q10.1.2 most candidates probably did not know what a raw material was. Common errors were as follows:
 - Q10.1.1: Most candidates thought that the raw material from which N₂ is obtained is manure or plants. Some of those who answered in terms of the process only wrote 'fractional distillation' without mentioning air.
 - Q10.1.2: A common incorrect answer was water. From the poor performance in this sub-question it is clear that most candidates were not familiar with the raw material (coal or earth gases) from which H₂ is obtained.
 - Q10.1.3: Many candidates did not know the catalyst and therefore *NH*₃ was a common incorrect answer.
 - Q10.1.5: The most common incorrect answer was 'Haber process' or 'Contact process'.
 - Q10.1.6: Many candidates wrote the reaction of ammonia with sulphuric acid instead of the reaction of ammonia with nitric acid. Some of those who used the correct reactants, provided the incorrect product. There was also a tendency to use N₂H₄O₃ or NH₃HNO₃ instead of NH₄NO₃ in the equation. Some candidates wrote the formula of nitric acid (HNO₃) in strange ways e.g. NO₃H or HONO₂
- (b) In Q10.2.1 many candidates wrote nutrients without stating that NPK represents the primary nutrients.
- (c) In the calculation in Q10.3.2, most candidates managed to get one mark for the ratio $\frac{4}{9}$, but did not know how to finally get to the percentage fertiliser. A common error was that candidates listed the three ratios without specifying which one is the ratio for phosphorous.

Suggestions for improvement

(a) Fertilisers will NOT be assessed in the final examination from November 2021 onwards.

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