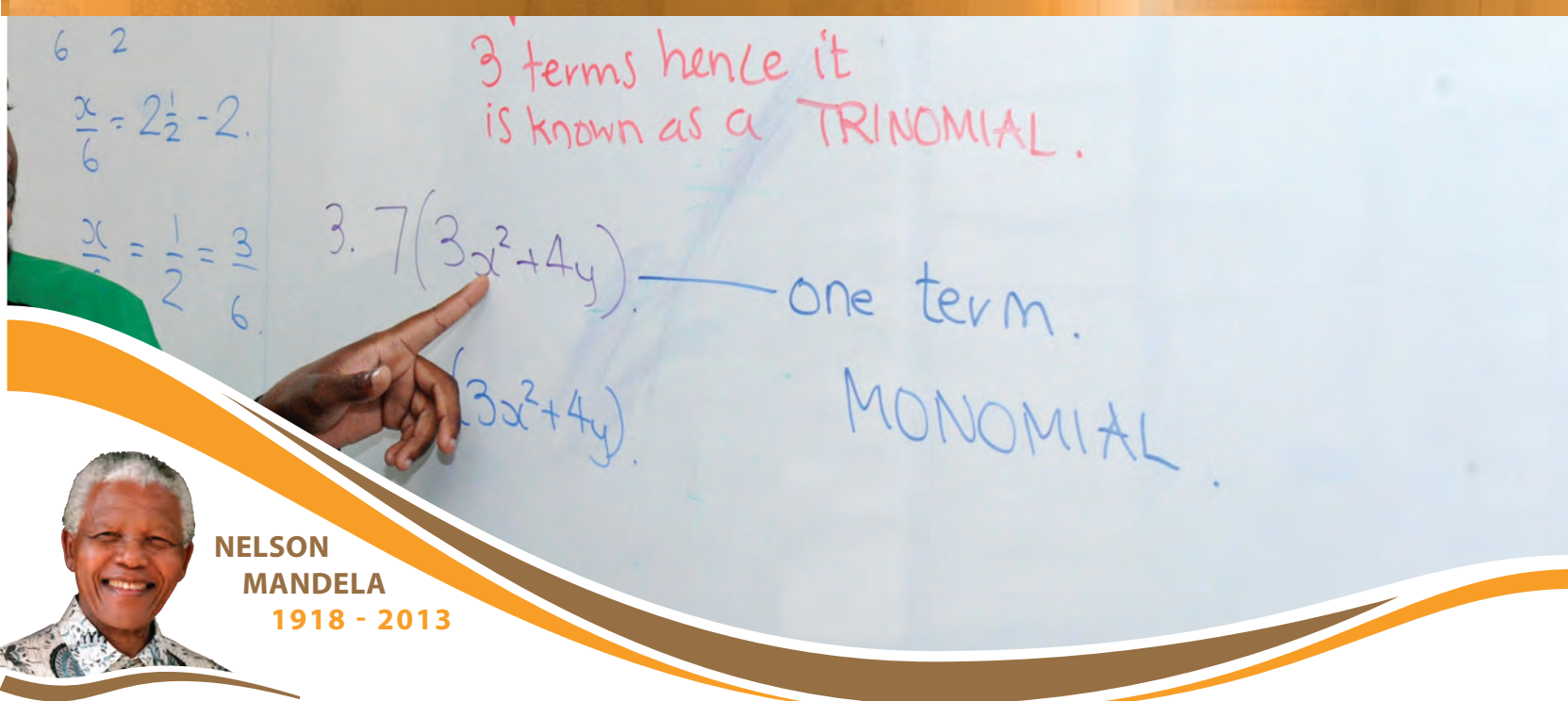


2013

# NATIONAL SENIOR CERTIFICATE EXAMINATION

## NATIONAL DIAGNOSTIC REPORT



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Basic Education  
REPUBLIC OF SOUTH AFRICA



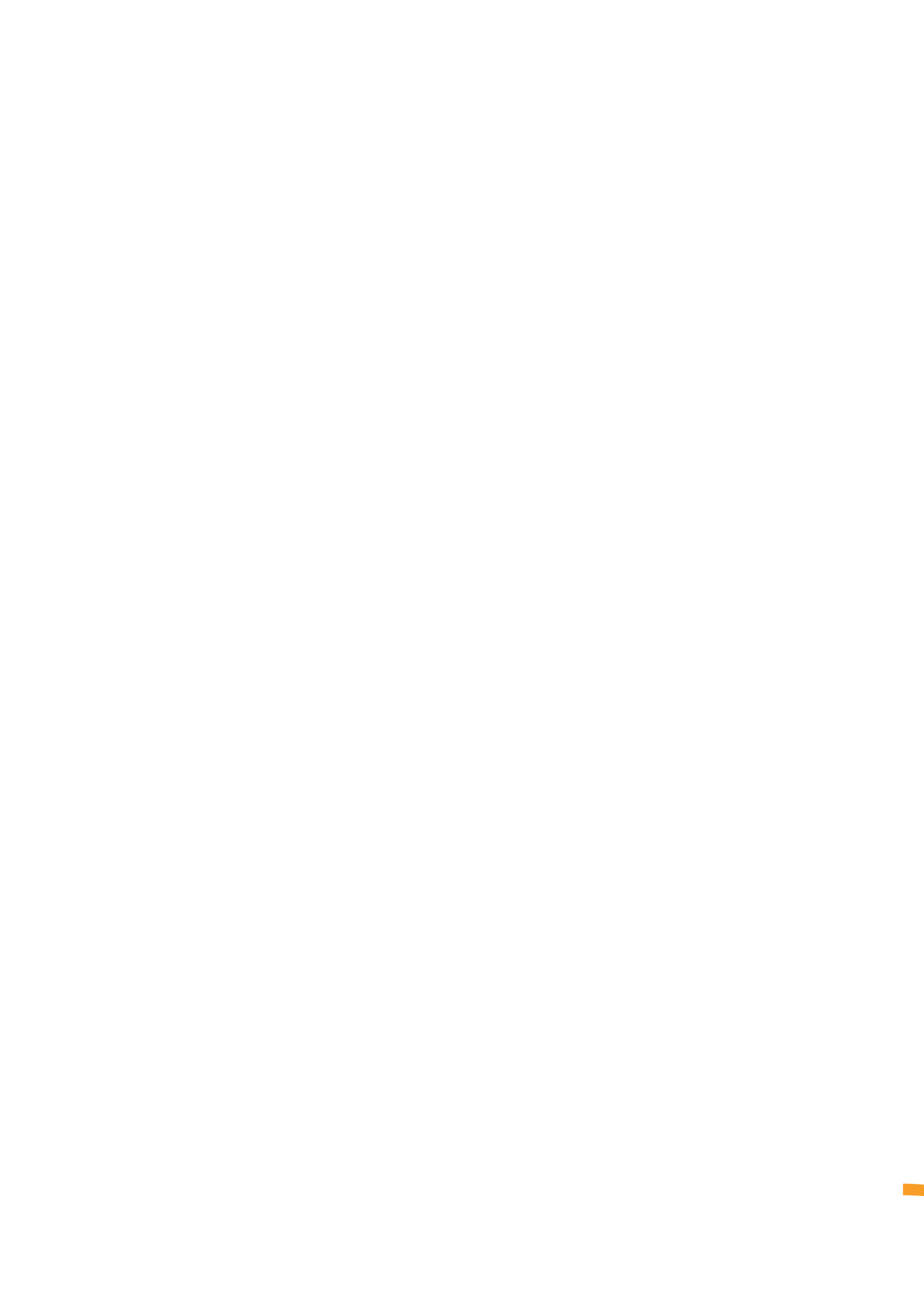


The background of the entire page is a photograph of a classroom. In the foreground, a student with a long braid is seated at a wooden desk, looking down at a book she is holding. In the background, two other students are visible, also seated at desks and looking towards the front of the room. The lighting is bright and natural, suggesting a daytime setting. The overall tone is educational and focused.

**2013**

**NATIONAL SENIOR CERTIFICATE  
EXAMINATION**

**NATIONAL DIAGNOSTIC REPORT**



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## LIST OF ACRONYMS AND ABBREVIATIONS

- CAPS** Curriculum Assessment Policy Statement
- DBE** Department of Basic Education
- FET** Further Education and Training
- ICT** Information and Communication Technology
- NCS** National Curriculum Statement
- NSC** National Senior Certificate
- PEDs** Provincial Education Departments
- MCQs** Multiple Choice Questions
- LOLT** Language of Learning and Teaching
- LTSM** Learning and Teaching Support Material
- SAGs** Subject Assessment Guidelines



I am pleased to release the National Diagnostic Report on Learner Performance of the National Senior Certificate (NSC) class of 2013.

The 2013 National Diagnostic Report on Learner Performance provides a detailed, per-question, analysis of the responses of learners on each item in selected question papers. This analysis enables us to identify learning and teaching weaknesses which require focused interventions at the classroom level. Read in conjunction with the Technical Report on the National Senior Certificate, 2013, which reflects on national, provincial and district performances, this report is a useful resource for all that are engaged in teaching and learning improvement in our country.


The report is based on the eleven subjects with high enrolments, namely; Accounting, Agricultural Science, Business Studies, Economics, English First Additional Language, Geography, History, Life Sciences, Mathematics, Mathematical Literacy and Physical Sciences. Based on the analyses, problematic content areas, frequently occurring errors and misconceptions as reflected in candidates' responses are indicated in this report. Together with these areas of weakness, suggestions for remediation are provided, which would be invaluable in planning the teaching and learning programme for the Class of 2014. All support structures that are responsible for quality teaching and learning, must take cognizance of this report and show how the contents of this report will impact on their plans for 2014.

Although the class of 2013 has recorded the highest pass rate in the six years of the implementation of the NSC, the quality of passes in key subjects such as Mathematics, Physical Sciences, Accounting, Life Sciences, Economics and Agricultural Sciences, are still below desirable levels. The Department of Basic Education, together with the Provincial Education Departments will collectively, establish a programme of intervention that will ensure an improvement in the performance levels of these subjects.

Diagnostic analysis must become an integral part of assessment and teaching, where the performance of learners in classroom based tests are analysed to identify problematic areas in the curriculum, and learning progress, so that there is continual review and realignment of the teaching and learning methodology.

The Department of Basic Education is committed to achieving the highest standard of education, because we believe as Tata believed that "Education is the most powerful tool which you can use to change the world ". We continue to work towards this vision, by identifying the areas where we need to work harder, smarter and better for improved quality, and this diagnostic report is intended as a tool to assist the sector to do so.

Congratulations to all the hardworking learners, teachers, principals, parents, and communities for their commitment and dedication in supporting the class of 2013 to obtain the highest pass rate since the advent of democracy in South Africa. By applying the recommendations from the 2013 National Diagnostic Report on Learner Performance into our concerted efforts to improve the quality of teaching and learning, and assessment practices, we will remain on course to achieving our targets to increase both the NSC pass rate and the quality of passes achieved in 2014.



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**MINISTER OF BASIC EDUCATION**  
**06 JANUARY 2014**

### I. INTRODUCTION, SCOPE AND GENERAL FINDINGS

The purpose of the National Senior Certificate (NSC) examinations is to measure learner achievement. Additionally, the NSC provides the opportunity to present valuable diagnostic information that should provide useful feedback to improve teaching and learning. This diagnostic analysis of the NSC examination data, identifies weaknesses and strengths in learning and teaching and provides concrete feedback to the system. The education sector is then expected to be responsive in its planning and intervention design to address the weaknesses and enhance the strengths, thus leading to improved learner outcomes in subsequent years.

The *National Diagnostic Report on Learner Performance* is based on qualitative data from subject reports, which have been compiled by the chief markers, internal moderators and subject specialists during the marking process in the 2013 NSC examination.

This report provides teachers, subject advisors, curriculum planners and other education support officials, with crucial information regarding the performance of learners in the selected subjects. Suggestions for improvements in teaching and learning are made, and include, among others, teaching methodology improvements and use of learning and teaching support materials (LTSM). It is expected that teachers of these subjects, together with their subject advisors, will interrogate these diagnostic subject reports, and apply the suggested remedial activities where possible or devise their own more appropriate remedial measures.

The *National Diagnostic Report on Learner Performance* is in its third year of publication. Where possible, attempts have been made to track progress made in the subject and content areas, which were highlighted as problematic in the previous years. Progress, or lack thereof, in the said areas, should determine the extent to which further intervention is required in 2014. This also suggests that continued reference to the previous reports by all practitioners involved in curriculum delivery is essential to ensure alignment with previous intervention strategies. Teachers needing additional professional development and support with regard to the teaching and learning of the identified areas should liaise with their respective Heads of Department, and the subject specialists at their local district offices, who are responsible for curriculum oversight.

It should be noted that the 2013 *National Diagnostic Report on Learner Performance*, its findings and recommendations are CAPS aligned. The 2014 NSC examinations will be based on the Curriculum and Assessment Policy Statements (CAPS), which will be implemented for the first time in 2014 in the Grade 12 examination. The terminology used, as well as comments and suggestions made, are aligned to the Grade 12 requirements as prescribed in the CAPS. In cases, where the issues raised or the recommendations made, are not applicable to the CAPs, this will be clearly indicated in the respective subject reports.

## I.2. SCOPE AND PURPOSE

The report covers the eleven NSC high enrolment subjects, namely; Accounting, Agricultural Science, Business Studies, Economics, English First Additional Language, Geography, History, Life Sciences, Mathematics, Mathematical Literacy and Physical Sciences.

Each subject report presents comparative learner performance trends in the last four NSC examinations (2010 to 2013), learner enrolment trends, a general overview of learner performance in the subject in the 2013 NSC examination and a per question diagnostic analysis.

Based on a detailed per-question analysis of the responses of candidates in each of the eleven subjects, using a sample of 100 scripts per province, per paper, the diagnostic analysis was completed. The remedial suggestions were not exhaustive, and therefore teachers and subject advisors should use these suggestions as a foundation for developing, implementing and monitoring the most appropriate remedial measures.

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 level. It is hoped that the diagnostic report will be seen as a key resource that will be utilised effectively by every Grade 12 teacher and subject advisor in 2014. Subject advisors are encouraged to mediate this key resource in their workshops with teachers in 2014. It is expected that the content and pedagogical challenges identified in the 2013 diagnostic analysis report will not recur in learner responses during the 2014 examinations. This will be a confirmation of a successful application of the diagnostic report.

The DBE and PEDs will monitor the distribution and utilisation of this report and feedback from teachers and subject advisors on the usefulness of these reports and how they could be improved in future years will be solicited. Opportunities must be created for teachers and subject advisors to make the desired inputs at school and district-level forums which support and monitor curriculum implementation

## I.3 METHODOLOGY

During the marking of the 2013 NSC examination, 100 scripts per paper, per subject were randomly selected from each province across the 118 marking centres countrywide. The scripts were randomly selected from a number of districts to cover low, medium and high scores.

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

Based on the analyses, a detailed explanation is provided per question/sub-question under the following three main titles:

## **Section 1: Performance Trends (2010 – 2013)**

This section presents a comparative analysis of the performance of learners over the last four 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. This data is based on the final scores as reflected in the Technical Report. The information is presented in tables and graphs to enable easier interpretation of any trends, especially on changes from year to year.

Performance distribution curves are also presented to graphically represent the distribution of learner scores in the last three examinations. These graphs are based on raw marks, prior to the adjustment process conducted by Umalusi. Any improvement or decline in the performance can be observed from the shape of the graph. A shift in the graph to the right suggests an improvement in performance, while a shift to the left indicates a decline in performance.

## **Section 2: Overview of Learner Performance**

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

## **Section 3: Diagnostic Question Analysis**

This includes the following:

- A graphical representation of average marks per question expressed as a percentage;
- An analysis of the performance of learners in the specific questions, stating whether the question was well answered or poorly answered (and the reason);
- Highlighting common errors and misconceptions that were identified in candidates' responses; and
- Suggestions for improvement in terms of teaching and learning, content and methodology, subject advisory support and provision and utilisation of LTSM.

The reports from all 9 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 2013 NSC question papers. Specific references are made to specific questions in the respective question paper in each subject.



## I.4 LIMITATIONS

The diagnostic analysis of learner performance in this publication is only limited to the 11 subjects that have high enrolments. It is hoped that the reports following this format and structure compiled by the provincial chief markers and internal moderators in the remaining subjects, but not covered by this publication, will be used by the PEDs.

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 2013 examination papers. Some of the quantitative data was drawn from an analysis of marks per question from the 100 scripts per subject analysed in each province. This proved useful in identifying the questions in which candidates performed poorly.

Qualitative data was derived from the reports compiled by the provincial chief markers and internal moderators. Although there were some differences in terms of the findings in each subject across the provinces, there were more common observations relating to the key errors and misconceptions, than differences. It is these common observations that informed the diagnostic question analysis for each subject in this report.

There are many remedial measures that have been elaborated on for each subject. The success of this document in achieving its goal is dependent on subject teachers and how effectively they adopt and implement these remedial measures. It is envisaged that subject advisors will provide the necessary professional development and support opportunities for this to happen.

## I.5 GENERAL FINDINGS

The 2013 diagnostic reports for the 11 subjects covered in this publication, indicate that there has been an improvement in the pass rate of most subjects at the 30% level. What is more encouraging is the increase in the pass rate observed at the 40% level. This is significant as it opens the doors to further education access and opportunity for a larger number of our learners.

Despite the general increase in the performance of candidates in the 2013 examination, and in the number who passed in many subjects, it is important to note the following areas of concern:

- Candidates seem to perform well in questions requiring short answers, but perform poorly in questions requiring extended responses in the form of paragraphs and essays or in questions where answers have to be substantiated. This may be due to lack of substantive preparation, and less practical application opportunity through homework exercises, and written work at schools. There are also indications that schools and teachers may not be providing learners with the necessary vocabulary to express their subject knowledge.
- A lack of understanding of the action verbs used in the questions, led to inaccurate interpretation of questions by candidates. This can also be attributed to poor language competencies especially in the language of assessment.
- Mathematical skills are a critical skills gap in many subjects, with predictable implications for learner achievement. Many reports in this publication attribute poor performance in such subjects to the poor mathematical skills of the candidates. Despite the improved pass rate in Mathematics and in Mathematical Literacy, the lack of foundational competencies in Mathematics remains a challenge across the board.
- The majority of subject reports indicate a lack of basic knowledge of concepts which are the prerequisite for higher level thinking. In many subjects, candidates were not familiar with basic terminology and lost marks unnecessarily as a result of this deficit. This is clearly indicative of a gap in content knowledge, curriculum coverage and teaching which needs urgent remediation.

- In many cases, poor performance in topics scheduled at the latter end of the year suggests that teachers may have neglected these topics or not provided the equivalent emphasis these topics required. In addition, the poor quality of answers even in low order questions suggests that some of the candidates were not adequately exposed to the relevant content.

## 1.6 KEY RECOMMENDATIONS

- Teachers and all stakeholders involved in teacher professional development and capacity building are urged to reflect on the contents of this report as they plan for 2014. It is important that they develop meaningful subject improvement plans which can be carefully monitored. The improvement plan should reflect what will be done differently in 2014 to improve learner achievement. It has emerged that mere compliance in monitoring curriculum coverage is not sufficient. Instead, integrated interventions focused on real gaps in teaching and learning, as well as the consistent and urgent application of subject content knowledge and teaching practice interventions are required.
- Once the report is received, PEDs should facilitate a capacity building session for the subject advisory services to ensure that this report is thoroughly mediated with this critical support structure. Increasingly, subject advisors are under immense pressure to provide much required mentoring and support to schools and teachers but their own professional capacity is limited by understaffing and high vacancy rates in their circuits and districts. This prevents them from being able to deliver as effectively and efficiently as all their schools and teachers require. The 2013 National Diagnostic Report for Learner Performance can be used as a planning tool by Districts to identify the specific school management and governance, CAPS, School Based Assessment, and teacher development issues that the subject advisory services can prioritise and respond to in 2014.
- This report can also be used by subject advisors as the basis for all capacity building interventions planned for teachers in their respective subjects (workshops and on-site support). Subject advisors should also monitor the improvement plans of their teachers, looking specifically for the inclusion of recommendations emanating from the individual subject reports.
- District officials should closely monitor curriculum coverage to ensure that all the topics in a subject have been covered according to the annual teaching plan. This will ensure that all topics receive due attention, allowing candidates to be better prepared for the examination. The monitoring process needs to also focus on the standard and quality of the tasks used for SBA as these tasks prepare learners for questions at different cognitive levels well before the NSC examinations, and they provide an opportunity for the teaching and learning interventions to gain traction well before the NSC examination.

## CHAPTER 2

### ACCOUNTING

The following report should be read in conjunction with the Accounting question paper of the November 2013 Examination.

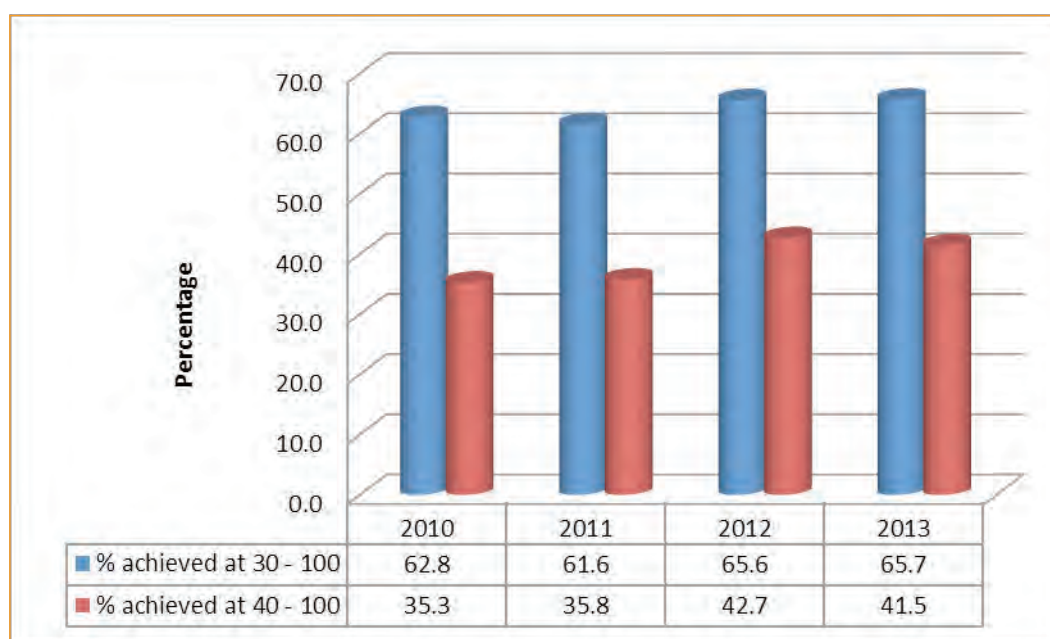
#### 2.1 PERFORMANCE TRENDS (2010 – 2013)

Of the 10 449 more candidates who sat for the Accounting examination in 2013, an estimated 8% more learners passed Accounting in 2013 compared to 2012. Although the percentage pass rate in Accounting in 2012 and 2013 stabilised at the 30% and above level, there has been a marginal decline of 1.2% in the 40% and above level. Despite the decline, this still represents 2 690 more students who passed accounting at 40% and above in 2013.

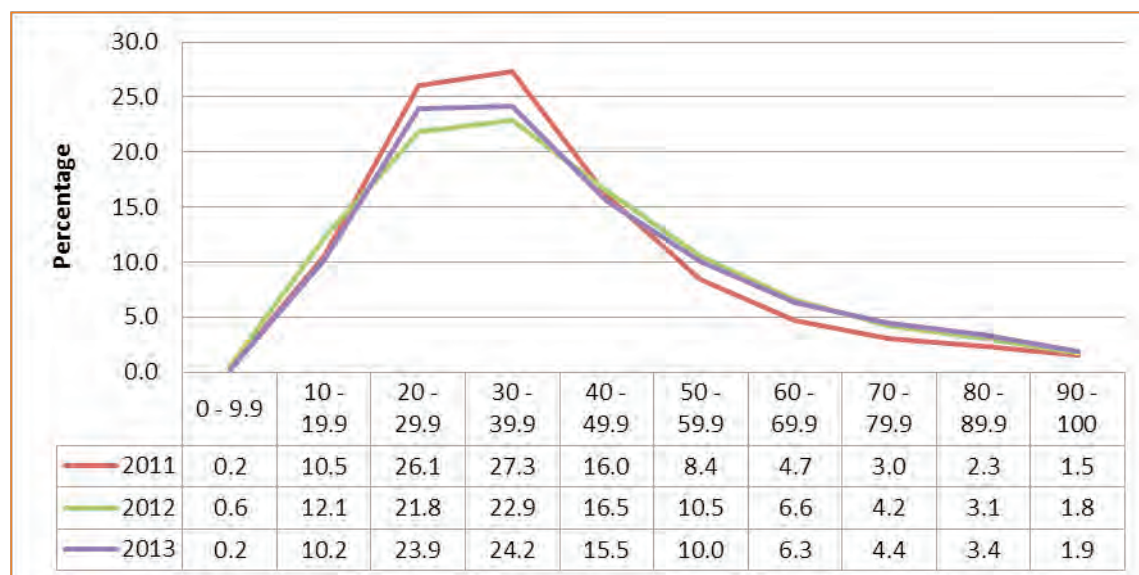
**Table 2.1.1 Overall achievement rates in Accounting**

Year	No. wrote	No. achieved at 30% and above	% achieved at 30% and above	No. achieved at 40% and above	% achieved at 40% and above
2010	160 991	101 093	62.8	56 752	35.3
2011	137 903	84 972	61.6	49 368	35.8
2012	134 978	88 508	65.6	57 621	42.7
2013	145 427	95 520	65.7	60 311	41.5

**Figure 2.1.1 Overall achievement rates in Accounting**



**Figure 2.1.2 Performance distribution curves (2011 – 2013)**



## 2.2 OVERVIEW OF LEARNER PERFORMANCE

### General comments

- All topics in the Accounting NCS have been covered in at least one of the five year-end or five supplementary examinations. Candidates therefore, had extensive resource material to assist them in preparing for the November 2013 paper. Many centres did not make use of the ten available past papers to prepare their learners. This could be due to a lack of finances to cover the costs of reproducing the past papers, or a lack of willingness on the part of teachers and/or learners to engage with these resources or use the previous Diagnostic Reports.
- The 2013 paper was generally regarded as fair and credible in terms of addressing subject content, cognitive levels and degrees of challenge. The questions in the 2013 Accounting paper were structured to reflect an appropriate balance between the different cognitive levels. Certain questions covering the lower-order cognitive range may be considered challenging for learners, while some questions covering the middle- or higher-order cognitive range might be less challenging.
- There was evidence that some teachers had used the information contained in previous Diagnostic Reports for Accounting. This, together with the interventions by the PEDs to assist learners, has ensured pleasing progress in many centres. Regrettably, the general performance of candidates on this paper did not match that of 2012, and it was disappointing to note that candidates in several centres did not perform better, as the opportunities existed for them to do so.
- An encouraging feature has been that a greater proportion of candidates engaged with every question, at least in part. There were few centres where candidates ignored entire questions. However, one skill that separates the successful from the less able candidate is the ability to focus specifically on the information that is relevant to answer each sub-question, and to use time effectively.
- Certain major NCS topics that were also included in the old Higher Grade (Report 550) curriculum continued to present major problems for candidates in many centres. Such topics included disposal of fixed assets, interpretation of financial information, identification of figures in a Cash Flow Statement and analysis of a Cash Budget.

- (f) The poor quality of answers in many centres indicates that problems still exist in the teaching and learning process. It is a concern that many candidates presented completely inappropriate responses to certain average or easy questions involving basic applications, such as foreign and misplaced items.
- (g) Many of the easy sub-questions covered basic theoretical knowledge essential for enabling candidates to engage with the more complex aspects of each topic. The continued failure of weaker candidates in some centres to answer these questions indicates that basic theory is not covered and the basic formats of financial statements or ledger accounts are not regularly or effectively reinforced.
- (h) General factors that prevented candidates from achieving better results this year were:
- **Inability to successfully deal with certain calculations:** The 2013 paper contained a number of arithmetical calculations. Many candidates do not understand the logic of the calculations required (signs, percentages and ratios); and
  - **Inability to identify information from tables:** To reduce the volume of reading, greater use of tables was made in the 2013 paper. This did not seem to have the desired effect of assisting weaker candidates to identify relevant figures.

### General suggestions for improvement

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

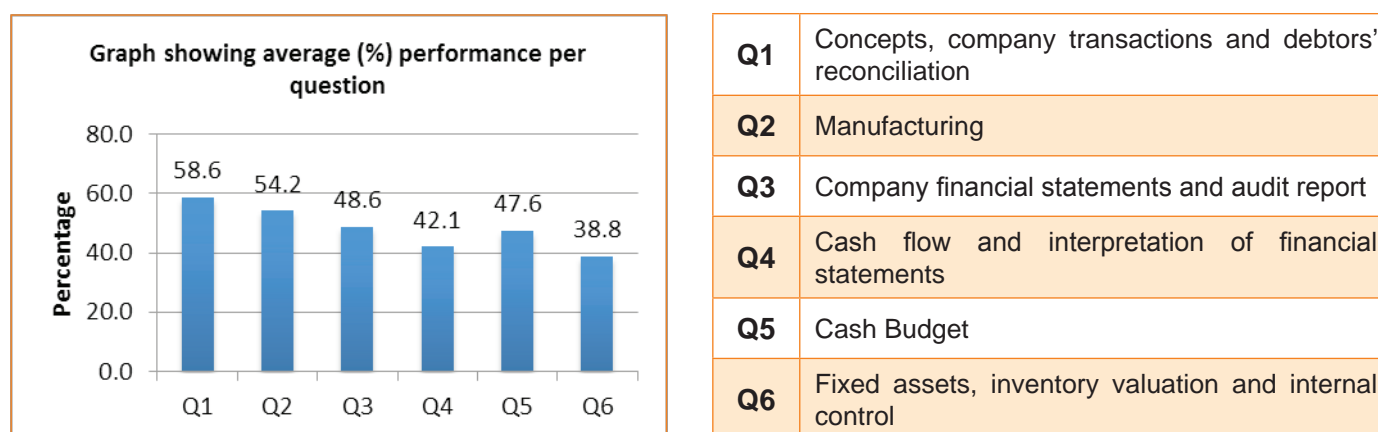
- (a) **Use of past NSC papers:** Every learner should have access to past examination papers. With the introduction of CAPS in 2014, it will be necessary for teachers to adapt parts of certain questions so that they can be used for revision purposes. Questions that include par value of shares and share premium will have to be altered and adapted. To comply with CAPS, teachers should ensure that learners have sufficient practice with questions involving repurchase (buy-back) of shares, and cash budgets and projected income statements in the context of companies (i.e. not simply in the context of sole traders). Teachers should also answer these papers themselves so as to improve their own confidence in their ability to deal with each topic.
- (b) **Basic concepts and the Accounting equation:** Teachers should ensure that learners understand and can explain the essential basic concepts and terminology before engaging in Accounting applications in each topic.
- (i) The most vital concepts are those contained in the expanded Accounting equation: **Assets + Expenses + Drawings = Capital + Income + Liabilities**. The process of conceptualizing and understanding the above goes much further than simply the rote-learning of definitions.
- (ii) It is also necessary for learners to appreciate the difference between different types of assets, different types of liabilities and different types of activities, i.e. current and non-current assets; current and non-current liabilities, and operating, financing and investing activities. This will enable them to prepare and interpret the different financial statements more effectively.
- (c) **Revision of relevant content of Grades 10 and 11:** 20% of an examination paper may contain content from previous grades that is pertinent to Grade 12 content. Vital aspects that must be consistently reinforced in the Grade 12 teaching programme include disposal of fixed assets, cash budgets, projected income statements, cost accounting and reconciliation statements (i.e. bank, debtors and creditors). The above topics must be revised and reinforced within the Grade 12 syllabus. The tight time frames in Grade 12 do not allow for complete re-teaching of these topics. Consolidation tasks on these topics are advised for weaker learners at the end of Grade 11, even after examinations have been written.

- (d) **Memorising and understanding basic formats:** Teachers should ensure that the basic formats of financial statements and ledger accounts are fully understood by learners.
- (e) **Internal control and ethical issues:** Teachers should teach not only the logic and the process of each Accounting application in the curriculum, but also the internal control measures and ethical considerations that are relevant to each application. These aspects must be integrated into the teaching of the relevant topics. Furthermore, as these issues are integrated in different topics in examination questions, integration in the teaching of the different topics should result in more effective understanding of these issues.
- (f) **Requirements of questions:** Teachers must become familiar with the requirements of typical examination – type questions in NSC papers. For example, if a question requires a figure to be provided in an explanation, this must be done to earn the relevant mark. Teachers should then ensure that learners are familiar with the basic layout of examination questions and where to look for the relevant information.
- (g) **Time management:** Learners must be trained in the art of managing their time and to adhere to the suggested time allocations provided in the paper.
- (h) **Comments and explanations:** Teachers need to train learners to express themselves clearly and simply where comments or explanations are required. In Accounting, the use of bullet points and short, concise sentences is acceptable.
- (i) **The importance of formative testing:** Teachers should ensure that they build up the confidence of learners in all topics through the use of short, informal formative tests. It is more effective if learners mark these formative tests themselves for immediate feedback and for an appreciation of how marks for easy parts of an examination question can be obtained. This will also force learners to take ownership of the learning process. The ‘confidence-booster’ easy sections in each of the questions in the NSC Accounting papers can be used as formative tests that may be self-marked by learners. Formative tests can also be used to great effect in introducing the new sub-topics in CAPS, e.g. repurchase (buy-back) of shares and reconciliation with creditors’ statements.

## 2.3 DIAGNOSTIC QUESTION ANALYSIS

The Rasch Analysis revealed the following average percentages for each question.

**Figure 2.3.1 Average marks per question expressed as a percentage**



<b>Q1</b>	Concepts, company transactions and debtors' reconciliation
<b>Q2</b>	Manufacturing
<b>Q3</b>	Company financial statements and audit report
<b>Q4</b>	Cash flow and interpretation of financial statements
<b>Q5</b>	Cash Budget
<b>Q6</b>	Fixed assets, inventory valuation and internal control

## 2.4 ANALYSIS OF LEARNER PERFORMANCE IN INDIVIDUAL QUESTIONS

### QUESTION 1: Concepts, Company Transactions & Debtors' Reconciliations

This was regarded as the easiest question in the paper. Many candidates did not answer certain parts of it well. The easily obtainable marks in this question were for the choice of correct words (Q1.1; 6 marks). This sub-question was generally well answered.

#### Common errors and misconceptions

- (a) The accounts debited and credited (Q1.2; 6 marks) was not well answered by many centres. This is of concern because these entries form the basis of the topic on company bookkeeping. Candidates who do not understand these entries will continually underachieve in their study of the major Grade 12 topic of Companies.
- (b) The effect on the basic Accounting Equation (Q1.2; 6 marks) was very poorly done by the majority of candidates, with completely incorrect responses and foreign items. This indicates that they are not able to conceptualise and understand what is meant by 'Assets', 'Liabilities' and 'Owners' Equity'. (refer to the expanded accounting equation)
- (c) The Debtors' List (Q1.3.2; 10 marks) was generally well handled by the majority of candidates. However, the corrections to the Debtors' Control account (Q1.3.1; 7 marks) were very poorly done. It appeared that many candidates were unfamiliar with the format. This format was asked in November 2011 (Q2.2) and November 2009 (Q1.2.1) in the context of bank and creditors' reconciliations. Candidates who prepared a Debtors' Control account in order to calculate the correct balance were given credit for their working.

#### Suggestions for improvement

- (a) Short formative tests at regular intervals on company ledger entries and the Accounting Equation are advised. All transactions should be linked to the double-entry principle.
- (b) The preparation of reconciliations (bank, debtors and creditors) must be done properly in Grade 11. Learners at that level must understand the similarities of all forms of reconciliations i.e. comparison to an external document/statement or comparison of a list of figures from a subsidiary ledger to identify differences.
- (c) Use of past NSC papers will ensure that candidates are familiar with the style of questions on the topic of reconciliations. Educators must encourage learners to use the formats given in the answer books. It should be noted that a new CAPS Grade 11 topic is reconciliation of a creditors' ledger account to a statement received from a creditor (additional revision questions will be required in this regard).

### QUESTION 2: Manufacturing

The quality of responses to this question varied significantly. Capable candidates who were confident of this topic and who could cope with the required calculations, achieved very well.

The easily obtainable marks in this question were for the choice of correct words (Q1.1; 6 marks). This sub-question was generally well answered as were the comments on the problem relating to direct labour costs (Q2.2.2; 7 marks). There was a noticeable improvement in the break-even analysis. Most candidates engaged with this sub-question and achieved part-marks or full-marks.

## Common errors and misconceptions

- (a) Many candidates did not do as well as expected on the preparation of the Production Cost Statement and the note for Factory Overheads (Q2.2.1; 13 marks). This could be because the structure of this question had not been utilised previously.
- (b) Weaker candidates were not able to calculate the weighted average to be used in the valuation of direct materials used (Q2.2.1; 3 marks).
- (c) Many candidates showed a lack of understanding of the splitting of costs between the factory and other departments. Many candidates were unable to apply basic arithmetical calculations to determine the figures for Factory Rent expense and Factory Water & Electricity. This was very disappointing, particularly in the case of the Factory Rent, which simply required the Administration Rent to be multiplied by 5. The calculation of the Factory Water & Electricity required a knowledge of percentage and ratios such as is taught in Mathematics from Grade 8 and in Mathematical Literacy.
- (d) Many candidates were not able to calculate the Cost of Production of Finished Goods for Production Cost Statement (Q2.2.1; 2 marks) or were unable to work backwards to calculate the missing figure for Work-in-process (Q2.2.1; 1 mark).
- (e) In commenting on the break-even point (Q2.3.2; 3 marks), many learners correctly compared their calculated break-even point (from Q2.3.1) with the number of units produced but were unable to earn full-marks, either because they did not quote the figures or because they did not provide the obvious comment on the effect on profit.

## Suggestions for improvement

- (a) Integration of stock valuation methods and fixed asset valuation methods are valid in the context of Manufacturing. Teachers should ensure that candidates are aware that knowledge or applications learnt in the Managing Resources modules are also applicable to topics in Financial Accounting modules. This should be reinforced in mid-year or trials examinations.
- (b) The splitting of costs between the different departments is an essential part of the topic of Manufacturing. Short formative tests on the splitting of costs according to ratios or percentages are essential, particularly for weaker candidates.
- (c) In commenting on the break-even point, relevant figures must be quoted to substantiate the comment as required by the question. Candidates will earn method marks if they quote an incorrectly calculated figure in the subsequent comment. They should also comment on whether the margin between the break-even point and the number of units produced will lead to a profit or not.
- (d) When teaching the preparation of the Production Cost Statement, teachers are advised to refer to the unit cost of production and to unit costs for materials, labour and factory overheads,. This can be done without requiring learners to formally calculate the unit costs at that stage, but it will serve to enhance understanding of the purpose and structure of this statement.



### QUESTION 3: Company Financial Statements and Audit Report

Performance in this question was satisfactory, although weaker candidates revealed serious errors of principle in their answers.

#### Common errors and misconceptions

- (a) Weaker candidates were not able to achieve the easily obtainable marks in the first part of this question i.e. choice of the missing words (Q3.1; 8 marks). The alarming lack of knowledge displayed by many candidates of the basic concepts relating to assets, liabilities, income and expenses explains the incorrect and foreign entries that they included in preparing financial statements such as the Income Statement.
- (b) Weaker candidates were able to earn easily obtainable marks by entering the pre-adjustment figures in the Income Statement, but were penalised to a limited extent for incorrect placement and foreign entries such as have no place in an Income Statement.
- (c) Weaker candidates were also not able to take advantage of the simple adjustments to the figures in the Income Statement (Q3.2.1) which comprised the audit fees (3 marks), bank charges (3 marks), repairs and maintenance (3 marks) and packing material (1 mark). They were also unable to earn the easily obtainable method marks for any balancing depreciation figure under operating expenses (2 marks).
- (d) It is difficult to explain why weaker candidates continue to place interest under operating income or operating expenses, as this on-going problem has been mentioned in previous Diagnostic Reports. The weaker candidates should have been able to earn the bulk of the marks allocated to interest income and interest expense as well as the subtotals at the bottom of the Income Statement (7 marks), but were denied this opportunity owing to poor understanding of the format of an Income Statement. Weaker candidates could also have earned at least five part-marks for the note for Retained Income (Q3.2.2; 7 marks), had they properly understood the format of this note. Teachers should note that under CAPS the note for Retained Income will include an entry in respect of the repurchase of shares.
- (e) Certain adjustments were included in this question to extend more capable learners, e.g. those relating to sales (2 marks), rent income (2 marks), known stock loss (2 marks), salaries and wages (2 marks) and interim dividends (2 marks).
- (f) Many candidates appeared to be unaware of the nature of a disclaimer audit opinion (Q3.3; 6 marks). However, they were able to earn part marks for explanations of any valid concerns, even when parts of the audit report were quoted with no insight.

#### Suggestions for improvement

- (a) It is essential that the expanded Accounting Equation be fully understood from an early stage of studies in Accounting i.e. from the GET phase, and particularly from Grade 10 in the FET phase.
- (b) Formative tests must be regularly conducted on the fixed format, without figures, of the Income Statement and Retained Income note, particularly for weaker learners, so that they identify the correct placement of the various categories of items. Candidates should also be alerted to the easily obtainable method marks for sub-totals, even if errors have been made in the preceding figures.

- (c) In the NSC exam, 300 marks have to be distributed to cover three modules. It is therefore impossible for all financial statements to be tested in one paper. The different financial statements will be rotated randomly over a period. Learners must get to know the basic formats of all major financial statements, as well as the relevant notes. Formative tests should be conducted on calculations relating to the number of shares and the amount of interim and final dividends. It is necessary to take heed of the changes relevant to CAPS when addressing the number of shares and the issue price of shares.
- (d) The approved textbooks will have covered the different types of audit reports, i.e. unqualified, qualified and disclaimer. After covering this topic, teachers should include it in tests and school-based examinations. Learners should be encouraged to discuss and debate the issues contained in different audit reports. This would broaden their knowledge and hone their ability to comment with insight.

#### **QUESTION 4: Cash Flow and Interpretation of Company Information**

Candidates generally performed well in the question on corporate social investment (Q4.1; 6 marks), although it is acknowledged that this sub-question could have been answered from the perspective of their general knowledge. It was pleasing that the majority of candidates were able to calculate the financial indicators (Q4.3; 14 marks), and were able to offer valid comments and at least earn part-marks for the interpretation questions (Q4.4 - Q4.8; 25 marks). Over the past few years, candidates have displayed pleasing improvement in these analytical sections of the syllabus, although in-depth revision will be required with each cohort of learners.

#### **Common errors and misconceptions**

- (a) Many candidates did poorly when it came to the calculations of figures required in the Cash Flow Statement (Q4.1; 15 marks). Numerous weaker candidates did not show workings to earn part-marks, were not able to use brackets appropriately in the Cash Flow Statement to indicate an outflow of cash, and could not identify the balance for Cash and Cash Equivalents at the beginning of the year.
- (b) Regarding the returns, earnings and dividends (Q4.5; 6 marks), many candidates simply quoted the figures and trends for the financial indicators without giving a meaningful interpretation. In order to earn full marks, the percentage return should be compared to the returns on alternative forms of investment; the effect of the improvement in earnings per share on the share price could be mentioned, and the dividends per share could be compared to the earnings per share to assess the extent of retained income.
- (c) Regarding the opinion on the issue price of the new shares (Q4.6; 5 marks), many candidates referred only to the increase or decrease in the net asset value or the market price, whereas the comparison of the net asset value and/or the market price to the issue price of new shares would have been more appropriate.
- (d) Regarding the use of loans (Q4.7; 4 marks), many candidates focused solely on the risk aspect (i.e. the debt: equity ratio). To obtain full marks, one also had to consider the positive gearing (i.e. the return on capital employed compared to the interest rate). In this case, conditions existed where the greater use of loans could have led to an increase in profit.
- (e) In identifying the major decisions made by the directors (Q4.8; 6 marks), many weaker candidates focused solely on less significant issues such as the sale of fixed assets for R86 000, whereas the issue of additional shares for R900 000 is considerably more significant.

## Suggestions for improvement

- (a) The Cash Flow Statement should be taught by focusing on specific aspects in isolation in order to develop learners' confidence in identifying specific figures and practicing the correct use of brackets to indicate outflows. Some of these figures are relatively easy to calculate, e.g. the difference between loans at the beginning and end of the year will indicate the value of the cash outflow (in brackets) or the cash inflow (without brackets). Formative tests on the specific items would be beneficial in developing learners' understanding. Note that under CAPS the Cash Flow Statement could contain an outflow under Financing Activities of the amount paid to repurchase shares from shareholders.
- (b) Where a bank overdraft exists, in calculating the Cash and Cash Equivalents from the Balance Sheet figures, learners must be taught to reduce the overdraft by the cash resources on hand (e.g. petty cash) in order to arrive at the correct net figure.
- (c) In commenting on financial indicators, learners must understand that part-marks are earned for quoting the trends in the actual figures from one year to the next or from one company to another. However, comments should go beyond merely quoting the trends. For example, in commenting on the returns, earnings and dividends of shareholders, candidates should also offer a general comment on or interpretation of the figures in order to earn full marks.
- (d) In commenting on the use of loans, in order to earn full marks for a comprehensive answer, learners must be taught to cover both the debt: equity ratio (i.e. to assess the degree of risk) and the return on capital employed compared to the interest rate (i.e. to assess positive or negative gearing).
- (e) In interpreting financial statements, including Cash Flow Statements, teachers should encourage learners to adopt the concept of Materiality in order to assess which figures are more significant or 'material' than others. This skill can be learnt by requiring learners to draw on personal interests or experiences, e.g. in a Cricket match, a century scored by a player is more significant than 20 runs scored by another player.
- (f) When teaching the preparation of annual financial statements in Grades 10 to 12, teachers are advised to encourage learners to question specific items and figures that they are preparing. This can be done on a simplistic level such as questioning whether the profit earned is satisfactory or not. This will serve to sow the seeds of an analytical or inquisitive approach by learners.
- (g) Despite the improvement noticed in the calculation of financial indicators, weaker candidates do require additional support. Teachers must continue to conduct formative tests on this topic at regular intervals, as this lends itself to all sections across the curriculum. Learners must also be taught to understand the logic underlying each financial indicator. It is a retrogressive step to expect learners to memorize formulae because these can easily be forgotten if the underlying logic is not understood. Also, inserting figures into a rote-remembered formula serves no positive educational purpose as learners will not be able to offer meaningful interpretations of the results. The formative tests should therefore cover both the calculation and the purpose of the financial indicator.
- (h) Teachers must also ensure that other ratios and financial indicators not tested in this examination be given the same emphasis, e.g. liquidity ratios.

## QUESTION 5: Cash Budget

Performance on this question was generally satisfactory. Many candidates were not able to earn marks on the easier parts to this question. The comparison of actual figures to budgeted figures was generally well done (Q5.3; 6 marks), with weaker candidates also able to offer valid points. The practical solutions to negative variances are often self-evident.

### Common errors and misconceptions

- (a) Weaker candidates performed very poorly on the completion of sentences (Q5.1; 6 marks). These sub-questions were regarded as easy. It was very disappointing that some candidates were unable to explain the main purpose of a cash budget, and some incorrectly offered calculation of net profit as the answer. They were also unable to identify items that appear in a Cash Budget but not on a Projected Income Statement, and vice-versa. Without this knowledge, such learners will always experience problems in preparing and interpreting these statements.
- (b) The calculations of the missing figures (Q5.2; 22 marks) included easy as well as more challenging parts. Many candidates were unable to factor the discount into the appropriate calculation for collection from debtors. Weaker candidates also experienced various problems in the other calculations. This was disappointing as most of these calculations required the skill of basic arithmetical logic such as is taught in the GET phase. Refer to the General Overview above.
- (c) Some candidates confused tenants with debtors in their advice on the rent variance.
- (d) Although most candidates were able to earn at least part-marks on the plan to increase sales and the number of credit customers (Q5.4; 6 marks), many weaker candidates did not interpret the question properly regarding all credit customers or new credit customers and were unable to offer valid points of advice.

### Suggestions for improvement

- (a) In order to develop an understanding of financial statements, including budgets, it is important for learners to understand the purpose of each financial statement and the nature of the information that it contains. This must be regularly reinforced by teachers through explanations and informal questioning techniques.
- (b) Teachers are advised to actively encourage learners to engage with questions involving interpretation of a Cash Budget or Projected Income Statement in class and in their revision activities. This topic is often based on common sense and logic. The skill of identifying the missing figures is closely related to the process of preparing these statements, which is a Grade 11 activity. Learning problems experienced by weaker learners will have to be addressed through corrective measures at that level.
- (c) The basic calculations are often not challenging and merely require practice and the application of arithmetical logic. This can be addressed through short formative tests.
- (d) Many weaker learners might have problems in properly interpreting a question or the information provided. For example, Information 6 related to Wages, and it was evident that many weaker candidates lacked the ability to engage with the four bullet points in the information. As a class activity, teachers are advised to spend time actually reading the specific information for a calculation with their classes, requiring the learners to do that specific calculation immediately, and then correcting the calculation immediately. Teachers of weaker classes will find that a piecemeal approach such as this will tend to reap the rewards of better comprehending of questions and of the information provided by learners.

- (e) This question integrates the scenario of an owner of a business seeking to increase sales and the number of credit customers. The curriculum advises teachers to integrate internal control and ethical scenarios such as this in the teaching of all topics, and to stimulate discussion around identifying problems, commenting and providing solutions.

### **QUESTION 6: Fixed Assets, Inventory Valuation & Internal Control**

Performance on this question was variable. Certain aspects were reasonably well done with many candidates being able to earn at least part-marks on several sub-questions e.g. concerns regarding fixed assets (Q6.1.3; 4 marks), valuing stock according to FIFO (Q6.2.1; 7 marks), calculating mark-up percentage (Q6.2.2; 4 marks), and comments on the mark-up (Q6.2.3; 4 marks) and stock level (Q6.2.4; 3 marks).

This question was intentionally placed at the end of the paper as it contained creative problem-solving aspects (Q6.3; 9 marks) which were intended to extend the more capable candidates, although many weaker candidates also earned marks for valid observations.

However, it was a concern that some candidates appeared to be rushing to complete this question as a result of exceeding the time allocations on the previous questions.

#### **Common errors and misconceptions**

- (a) Weaker candidates continued to experience problems in determining the figures to be inserted in the Fixed Assets Note (Q6.1.1; 9 marks), particularly in the calculation of depreciation on vehicles. The entries provided by weaker candidates for the Asset Disposal account (Q6.1.2) were often completely incorrect, even to the extent that these candidates did not earn marks for the details. Again, these are Grade 11 topics which are reinforced in the Grade 12 curriculum under Companies. It is clear that these candidates have not properly grasped the application of depreciation and asset disposal entries, prior to entering Grade 12.
- (b) Although most candidates were able to earn at least part-marks on the stock calculation (Q6.2.1; 7 marks), problems experienced by weaker candidates involved the identification of the units to be used for the different cost prices in the calculation.
- (c) Although most candidates were able to earn at least part-marks on the calculation of the stock holding period (Q6.2.2; 4 marks), many weaker candidates inverted the numerator and denominator, thereby effectively calculating the stock turnover rate.

#### **Suggestions for improvement**

- (a) The applications involved in valuing fixed assets and stock require regular practice and continual reinforcement at appropriate times. These can be integrated into other Grade 12 topics such as Companies, Manufacturing and Projected Income Statements to eliminate the need to devote additional revision time to these topics. Teachers should ensure that the opportunities are used to include these applications in class tasks and tests on a regular basis.
- (b) Teachers must ensure that the procedures of calculating depreciation and drawing up asset disposal accounts and fixed asset notes are properly addressed by the end of Grade 11. Refer to the General Overview above for further comment on this.

## AGRICULTURAL SCIENCES

The following report should be read in conjunction with the Agricultural Sciences question papers of the November 2013 Examination.

### 3.1 PERFORMANCE TRENDS (2010 – 2013)

For Agricultural Sciences, in 2013, compared to 2012, there was a 7 percentage point increase in the cohort of learners who achieved at 30% and above, and a 8,9 percentage point increase in the cohort of learners who achieved at 40% and above. The general upward trend since 2010 is encouraging and the increase in the pass rate at the 40% and above level indicates an improvement in the quality of passes. 2013 was a particularly good year for quality improvement as the number of candidates passing was boosted by around 10 000.

**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
2010	85 523	53 573	62.6	27 427	32.1
2011	77 719	56 404	71.3	30 678	39.5
2012	78 148	57 571	73.7	32 064	41.0
2013	<b>83 423</b>	67 437	80.7	41 654	49.9

**Figure 3.1.1: Overall achievement rates in Agricultural Sciences**

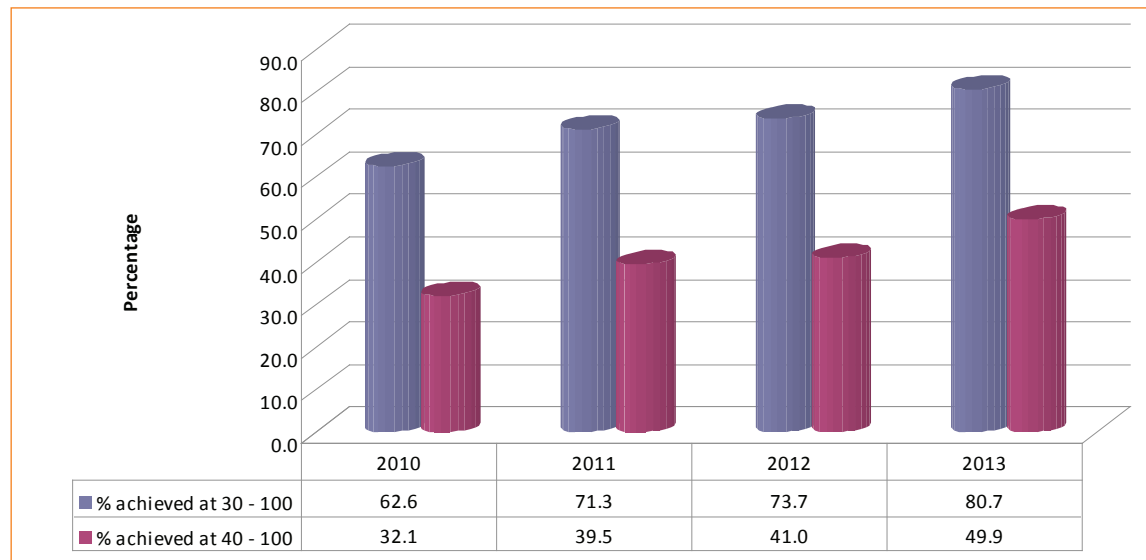
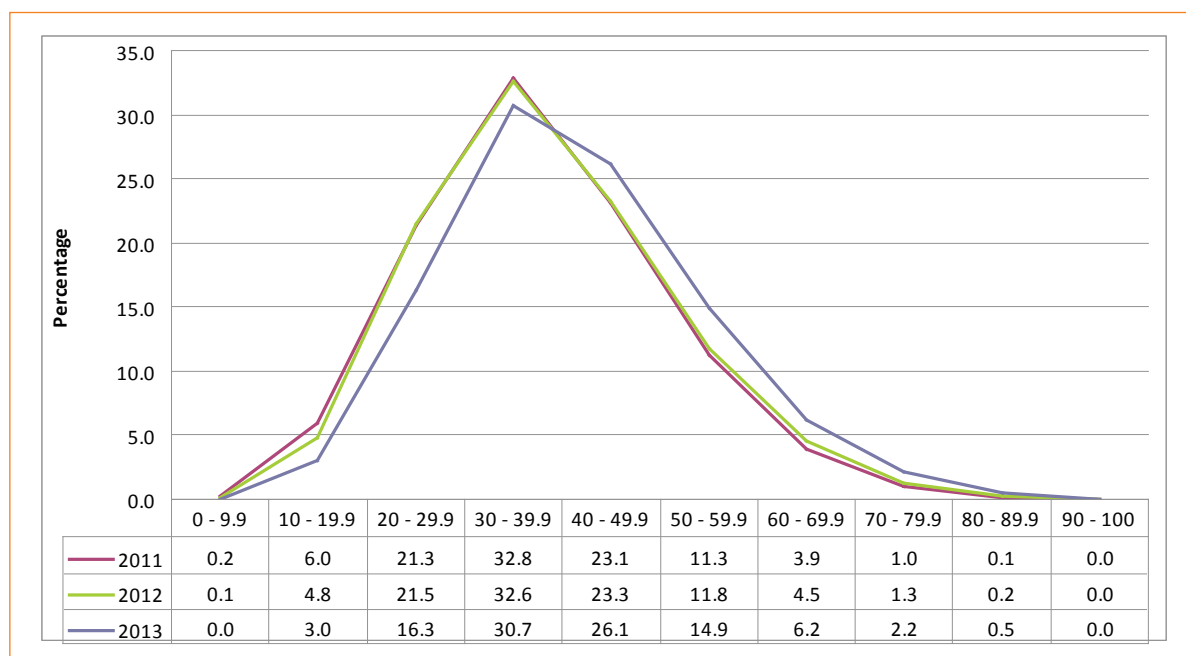


Figure 3.1.2: Performance distribution curves in Agricultural Sciences (2011 – 2013)



In 2013, there was a decrease in the percentage of learners who performed at 0 - 29% compared to previous years.

## 3.2 OVERVIEW OF LEARNER PERFORMANCE IN PAPER I

### General comments

- There was a marked improvement in the performance of candidates in this question paper compared to that of preceding years. This improved performance could be linked to learners and teachers having a clear idea of what to expect in the NSC papers. Important concepts, calculations and content visible in previous NCS question papers are covered in detail.
- There was a significant improvement in the performance of learners in Section A, which also contributed positively to the overall improvement in this paper.
- Some examination centres performed extremely well, with averages between 60% and 70%, while it is a concern that other centres did extremely poorly with averages ranging below 30%.
- School-based factors that might have contributed to poor performances in certain centres are:
  - Teachers of Agricultural Sciences who have not been trained in the subject:** Such teachers might not be confident when dealing with the subject content and rely almost exclusively on the relevant policy documents and other forms of support material.
  - Quality and quantity of school-based assessment tasks:** Learners who are exposed only to the minimum number of formal school-based assessment tasks are severely disadvantaged, particularly if these tasks are of variable standards.
- Most candidates struggled with data response questions and were unable to interpret graphs, tables, illustrations, pictures and diagrams.

- (f) For many candidates, language and terminology deficiencies are barriers to understanding and expressing themselves. Misinterpretation of questions was often evident.

### General suggestions for improvement

- (a) Judging from the general performance of candidates in the 2013 paper, a greater focus on the following practices should assist in improving the performance of learners in future papers:
- **Knowledge of practical situations:** Teachers should broaden their knowledge and practical experience in certain areas of the curriculum so as to be able to expose learners to practical situations. For example, animal production (Q3) requires candidates to understand the basic handling of farm animals and the facilities required. In addition they need an understanding of animal health and protection (which will form part of Q3 in 2014) which requires candidates to understand the different diseases, parasites and challenges. Teachers are advised to organise excursions for learners to expos, farms, research stations and agricultural organisations, to make use of publications such as Farmer's Weekly, to provide access to DVDs and other video material linked to the course content and to involve learners in agricultural youth conferences or entrepreneurship programmes. These strategies would enable learners to acquire a broader perspective of agriculture in South Africa. Teachers are also advised to make use of the short courses on offer so as to broaden their own knowledge of these topics.
  - **Alignment of school-based assessment tasks to NSC standards and exposure to different types of questions:** Teachers need to follow and interpret the work schedule correctly in order to spread the content evenly through the year. Teachers need to utilise the annual teaching plans in the CAPS document for the subject, previous NSC examination papers, together with other available resource material, to prepare learners more effectively and to inform the development of teaching and assessment programmes. More intensive moderation of internally generated SBA tasks is necessary to ensure that the required standard is maintained. Class tests and school-based examinations should be in line with the format, style, standard and level of difficulty of questions in NSC papers. Teachers must set tasks involving case studies, scenarios and short essays more often for application-type and interpretation-type questions. They must gain exposure to questions that link case studies to the subject content and questions which require interpretation of information so as to arrive at appropriate conclusions.
- (b) Teachers and learners should familiarise themselves with the format of the Agricultural Sciences examination papers aligned to the CAPS. In addition, learners should be exposed to the exemplar containing Agricultural Sciences examination papers which are aligned to the CAPS.
- (c) Teachers should refer to several available textbooks, although the learners might use only one. The different books provide a good opportunity to expose teachers and learners to a wider range of activities.
- (d) Many learners still lack the basic conceptual knowledge and teachers should use various approaches to expose and explain terminology and concepts to learners. Some resources other than textbooks should be used such as PowerPoint presentations and agricultural magazines. Learners should also be encouraged to follow television programmes such as *AgriTV* on SABC 2 and to develop a comprehensive understanding of concepts in the subject.
- (e) It is advised that learners in Agricultural Sciences include subjects such as Mathematics, Life Sciences and/or Physical Sciences and Accounting in their subject package because of the demands of the subject that is closely linked to these subjects.

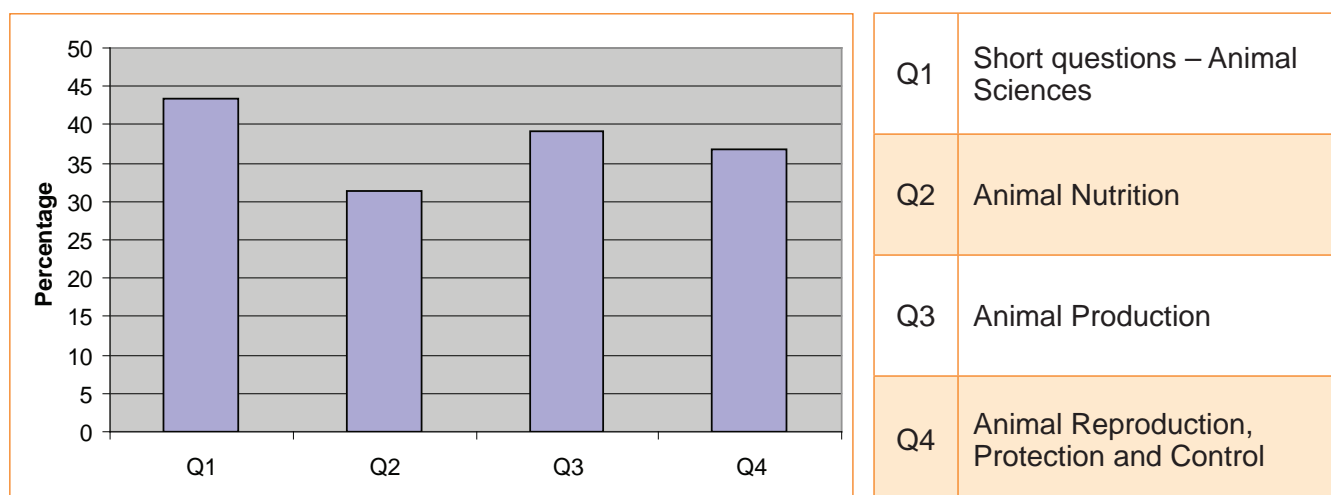


- (f) Teachers should expose learners to regular informal assessment tasks or activities that will improve their confidence in dealing with the subject content. The learners themselves can mark short, formative tasks and it is arguably more effective for them to do so.
- (g) The setting of quality-assured common tasks on more challenging sections of the curriculum, such as graphs and data response questions, is advised at the cluster or district level.
- (h) Greater exposure to past NSC papers is likely to lead to improvement in the performance of candidates, but learners should be aware that they cannot prepare their responses in rote fashion as answers to previous questions will not necessarily apply if the questions are modified.
- (i) 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 in their second language. Such learners also find it challenging to express their responses.
- (j) Learners should be exposed to simple science calculations involving percentages, ratios, conversions of decimals, mass, weight and length, as well as their respective units. Calculations are an integral part of the subject. It is recommended that a calculation be started with the formula/formulae given, then the correct substitution followed by the calculation and ultimately the correct answer. The final answer should be rechecked, if time allows. Formative class tests on calculations are advised.
- (k) Learners should avoid leaving questions unanswered or blank spaces in questions, especially multiple choice questions in Section A as these questions are not negatively marked.
- (l) Learners must adhere to action verbs describing the requirements of the question.
- (m) Teachers should emphasise to learners the important aspects when interacting with a case study or scenario and learners must be guided in these questions that require an answer from the analysis of the picture within a case study/scenario as well as on how to use insight to answer the question.

### 3.3 DIAGNOSTIC QUESTION ANALYSIS FOR PAPER I

A sample of scripts from each province revealed the following performance in each question.

**Figure 3.3.1: Average marks per question expressed as a percentage for Paper 1**



### 3.4 ANALYSIS OF LEARNER PERFORMANCE IN INDIVIDUAL QUESTIONS IN PAPER I

#### QUESTION ONE: Short Questions - Animal Sciences

##### Common errors and misconceptions

This question was generally answered well and reflected an improvement in performance in comparison to previous years.

- (a) Multiple-choice questions (Q1.1): Many candidates showed an inability to choose the correct combination in these questions where a range of combinations was supplied.
- (b) Matching Columns (Q1.2): The instruction to this question required candidates to either indicate A only, B only, A and B or None. Many candidates did not follow the instruction and they wrote C instead of A and B, and D instead of None, and therefore lost marks.
- (c) Terminology (Q1.3): Candidates just repeated a term given in the question. For example, 'quarantine' was an expected answer for Q1.3.5 but some learners indicated 'isolation' which was part of the question.
- (d) Correct the underlined word (Q1.4): Candidates did not read the question carefully. For example, in Q1.4.4 candidates were expected to provide an answer for an intensive farming enterprise for cattle which is a 'feedlot' but most candidates wrote 'battery system' as the answer which refers mainly to poultry production.
- (e) Over-reliance on past question papers poses a great challenge on how to answer questions. For example, in the matching type questions (Q1.2), candidates still used the instruction as it was worded when having an answer sheet.

##### Suggestions for improvement

- (a) Learners need to be exposed to similar types of questions in their formal SBA activities (tests and examinations). This will make them comfortable with the expected format of questions.
- (b) Candidates performed better with terminology questions but still need to be tested informally on a regular basis on items from a glossary list to ensure more exposure to terminology.
- (c) Learners must be made aware that no answer sheet is used in the NCS question paper any longer and the instructions for the sub-questions should be followed and answers written in the answer book.
- (d) Short questions can be effectively practiced in formative class tests and marked by the learners themselves.
- (e) Development of a concept bank per chapter is recommended to exercise meaningful understanding of concepts. Including a variety of examples from all available approved textbooks can do this.
- (f) Learners should be given homework to peruse the unit to be taught beforehand, and then identify concepts to be dealt with in the class for discussion and to understand the language of the subject.
- (g) Learners should be taught to identify the main phrases/key words in a question that inform their answers.

## QUESTION TWO: Animal Nutrition

Most centres performed below expectation in this question as many candidates still encountered problems with calculations in this question.

### Common errors and misconceptions

- (a) A large portion of this question was devoted to common calculations that are evident in all the previous NSC papers. Basic calculations that involve the nutritive ratio and Pearson Square method still posed serious challenges for the majority of the candidates.
- (b) Many candidates wrote the answer of the Pearson Square method as a percentage and not as a ratio (or as parts) and some changed the sequence of the values in the Pearson Square around in the final answer (Q2.4).
- (c) Many candidates could not relate the secretion of pancreatic juice to the closest label which is C (small intestine) and they also failed to describe the adaptation features of C. Most candidates could not explain the absorption of fat molecules by the small intestine.
- (d) Many candidates misinterpreted Q2.4 and wrote deficiency diseases instead of the nutrient elements.

### Suggestions for improvement

- (a) Learners need to be exposed to similar examples in their SBA tasks. The calculations need to be practiced regularly and learners need to be exposed to different ways of doing calculations.
- (b) Learners need to plan their learning well ahead of time as large volumes of content are linked to the topic of nutrition.
- (c) Subject advisors should conduct intervention workshops for teachers on this topic. This should be supported by team-teaching, lesson studies in cluster groups and classroom support visits.
- (d) Assessment of all calculations as often as possible will help expose learners to continuous revision for examination readiness.

## QUESTION THREE: Animal Production

Most candidates performed reasonably well in this question.

### Common errors and misconceptions

- (a) Most candidates failed to read some questions carefully. For example, in Q3.1.3 D was given as an answer instead of B and E. D was seen as a the straightforward answer but candidates do not look at how the question is framed.
- (b) Many candidates could not deduce the correct answers from the given data in Q3.2 and found it difficult to explain the definition for 'the optimum temperature range for production output' as they wrote it as 'the maximum temperature for production' instead of 'the most suitable temperature for production'.

- (c) This question was strongly linked to application of knowledge, data response and practicalities in animal production. Many learners were not exposed to facilities, equipment and animal behaviour in this context and they consequently found some of these questions very challenging. Some candidates' responses were incorrect as they were taken directly from the case study. This indicates that data response questions are a challenge, requiring attention.
- (d) Very few candidates were able to calculate the quantity of feed used for production in Q3.4.1.

### **Suggestions for improvement**

- (a) Teachers should use excursions and DVDs to assist learners to understand concepts of a more practical nature.
- (b) Learners also need to be given scenarios and case studies to strengthen their skills with regard to this topic.
- (c) Teachers must encourage learners not to simply repeat information from the question, but to identify what is required by the question and to provide insightful comments in their responses.
- (d) Teachers are referred to the general overview of learner performance in this paper for suggestions concerning the alignment of School-Based Assessment tasks to requirements in the CAPS document. Learners should be exposed to different types of questions. They should also be exposed to various types of LTSM to enhance their experience of practical situations.
- (e) Teachers should provide enrichment activities, particularly in the form of worksheets that would enhance reading and interpretation of data/information.
- (f) Use tables to provide learners with precise differentiation of the characteristics of intensive and extensive production systems.
- (g) More emphasis should be put on differentiation of the types of intensive production units for example, battery system, broiler system and feedlot system.

### **QUESTION FOUR: Animal Reproduction, Protection and Control**

The performance of candidates in this question was better than in the previous years as most candidates are now more adept at drawing graphs than their counterparts in previous years.

#### **Common errors and misconceptions**

- (a) Many candidates could not identify the correct labels in the diagrams. Subsequently, they could not answer some follow up questions.
- (b) Many candidates confused 'maceration' with 'mummification' in Q4.1.4. Similar terms could be expected in future NCS question papers.
- (c) In Q4.3.5, many candidates simply copied some of the indigenous methods from the given data, which resulted in them losing marks.

## Suggestions for improvement

- (a) Teachers should provide diagrams when setting formative assessment tasks for learners to label the different parts. The diagrams required for the topics related to this question could be found in the different textbooks or can be downloaded from the internet. It is important to expose learners to different types of diagrams and not only the diagrams found in their textbooks.
- (b) Labeling skills can be developed through short formative tests that could be marked by the learners themselves.
- (c) Learners need to be exposed to more data response questions through worksheets and case studies. There are also several appropriate questions from past NSC papers that can be used in this regard.
- (d) Some learners did not answer all questions and this indicates that they did not manage their time effectively.
- (e) In teaching the section on reproductive organs, charts, pictures and diagrams from a variety of resources should be used to reinforce and enhance understanding. Learners must understand how to differentiate between concepts, and describe functions and adaptations of the various organs.
- (f) Graphs form an integral part of learner assessment in this topic. Learners need to be able to interpret and draw graphs. This skill is developed through regular practice. All types of graphs should be taught, with emphasis on the interpretation thereof. Important aspects assessed when drawing a graph include the following:
  - A correct heading;
  - Correct labelling of both axes and the inclusion of correct units;
  - The correct type of graph and a suitable scale;
  - Values correctly plotted/indicated; and
  - Relevant key.
- (g) Teachers need to put more emphasis on reproductive organs, different types of hormones, their functions and effects, different diagrams based on hormones, as these aspects will be covered in Q4 in NCS examination from 2014. All marks in this question will then be on animal reproduction.

## 3.5 OVERVIEW OF LEARNER PERFORMANCE IN PAPER 2

### General comments

- (a) Generally, the performance of the candidates in this paper was better than that of previous years. In the question on Basic Agricultural Genetics (Q4) there was substantial improvement.
- (b) Question 1 (Section A) was the best-answered question in Paper 2. While most candidates performed well, with a few cases of exceptionally good work, weaker candidates revealed a lack of understanding of content terminology in basic genetics.
- (c) In most cases, candidates performed poorly in data response questions. They struggled with interpretation of case studies, tables, illustrations and diagrams. Deficiencies in calculations may be attributed to candidates' unfamiliarity with formulae.

- (d) Because of the nature of the paper, a significant amount of reading was required, which caused problems for many candidates.
- (e) Candidates writing the examination in a language other than their home language tend to experience difficulty in interpreting questions. They also find it challenging to correctly phrase their responses.
- (f) Candidates seemed to be prepared for this examination. There was an improved ability to answer some of the analysis and interpretation questions correctly.

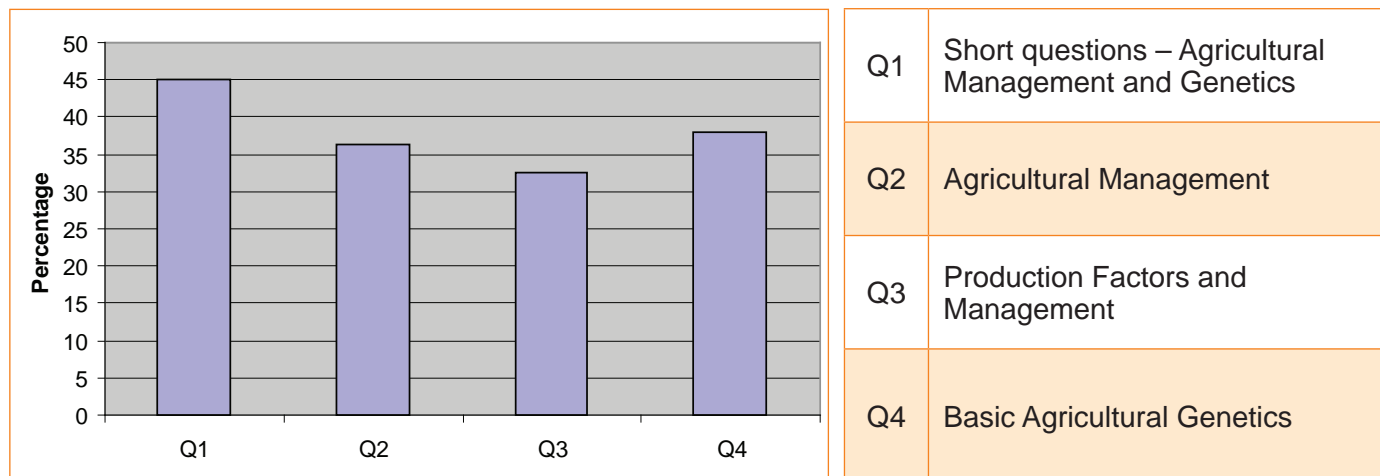
### **General suggestions for improvement**

- (a) Teachers are advised to do more than the minimum number of School-Based Assessment tasks that comprise the formal requirement, because learners require additional practice in answering lengthy questions.
- (b) Teachers should make use of past NSC question papers as a guide to the required standard for SBA tasks.
- (c) Many of these questions could be adapted for assignments, which would also assist learners to prepare for the NSC examination.
- (d) The suggestions for improvement reflected in the overview of Paper 1 apply equally to Paper 2. Refer specifically to the points relating to visual LTSM resources, exposure to practical situations, mathematical calculations and terminology.
- (e) Teachers need to pace the coverage of content so that this can be completed prior to the start of the preparatory examination, and leave sufficient time for revision thereafter.
- (f) Teachers should expose learners to different types of longer questions that involve more reading. It is clear that learners have problems interpreting case studies, scenarios and data response questions. It is imperative that learners engage with previous NSC question papers at the beginning of the Grade 12 year so that they are familiar with the respective formats and style of the different question stimuli and texts well in advance of the examination itself.
- (g) Learners should be exposed to reading external articles where the different terms and concepts are used in real life situations and the context in which they are used will help them to expand their understanding of the subject as well as their vocabulary and ability to apply such information in any of the assessments that could be given to them.
- (h) Teachers should guide the learners when going through past papers to grasp the underlying principles that will enable them to use that knowledge in any related question set for them. Teachers need to place more emphasis on making the learners understand the concepts instead of just memorising them.
- (i) Learners need to be exposed to tasks that require them to read and summarise various texts so that they learn how to interpret different texts as well as improve their vocabulary.
- (j) Genetic modification is a new topic to which our teachers require greater exposure. Subject advisors should address this need through content workshops.
- (k) Standardised formal tasks should be prepared in order to raise the level of questioning and to train learners to master the techniques of answering questions with a higher cognitive demand that need reasoning and application.
- (l) Subject terminology is vital and needs to be taught, assessed and revised as often as possible.

### 3.6 DIAGNOSTIC QUESTION ANALYSIS FOR PAPER 2

A sample of scripts from each province revealed the following percentages for each question.

Figure 3.6.1: Average marks per question expressed as a percentage for Paper 2



### 3.7 ANALYSIS OF LEARNER PERFORMANCE IN INDIVIDUAL QUESTIONS IN PAPER 2

#### QUESTION ONE: Short Questions - Agricultural Management and Genetics

This question was generally well answered and this performance could be attributed to the understanding of concepts and continuous exposure to these terms through informal and formal tasks.

#### Common errors and misconceptions

- (a) Remarks for paper 1 on question 1 are also applicable to paper 2.
- (b) Many candidates could not identify or use the correct terminology in these questions.

#### Suggestions for improvement

- (a) Learners need to be exposed to similar types of questions in their formal SBA activities (tests and examinations). This will continue to make them more comfortable with the expected format of the question.
- (b) It is clear that learners continue to struggle with terminology questions. Learners need to be tested informally on a regular basis on items from a glossary list to provide them with more exposure to the terminology.
- (c) Teachers are advised to use similar instructions for these questions and learners must complete the answers in their answer books for school examinations in the course of the year.
- (d) Candidates should be reminded that only the most appropriate answer is accepted in a multiple-choice question. Learners need to take note of this and not choose the answer that appears to be correct at first glance.

## QUESTION TWO: Agricultural Management

This question was generally poorly answered.

### Common errors and misconceptions

- (a) In the graph (Q2.1) many candidates omitted the price units and most of them included animal products whereas the question only referred to plant products.
- (b) Candidates worked out the differences in the price changes and failed to identify the appropriate price changes.
- (c) Many candidates could not comprehend the meaning of the trend, and they did not know how to compare the two variables (change in the price of plant products versus animal products).
- (d) In Q2.3 candidates were generally unable to provide the market driven reaction of the farmers - they interpreted it from an emotional perspective stating that farmers are happy when the prices increase.
- (e) The high incidence of poor performances in the paper as a whole might be attributable to inadequate preparation of material related to this question.

### Suggestions for improvement

- (a) Teachers are encouraged to expose learners to all possibilities related to the demand and supply graph, and thus the elasticity of demand and supply that is visible in these graphs should be explained.
- (b) Teachers should ensure that there is a comprehensive understanding of formulae and correct calculations.
- (c) It seems some candidates were not adequately prepared for the content topics linked to this question. Learners need to plan their studies well ahead of time as large volumes of content are also linked to this question.
- (d) Teachers should expose learners to all the marketing concepts that are linked to agricultural products. Learners should be exposed to activities during informal assessment, which contain various questions that will enable them to analyse, comprehend and interpret information.
- (e) Teachers should focus on all aspects of the content that are listed in the Examination Guidelines.
- (f) There might be topics that have not been covered in recent question papers, but they remain important content topics.
- (g) 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 facts and in line with the requirements of the question. Open-ended questions can be obtained from previous NSC papers and can be developed from media articles.
- (h) Teachers should guide learners on how to use past papers for emphasis on concepts so that they can use that information effectively. Learners need to be aware of the different methods that can be used to ask and answer questions.



### QUESTION THREE: Production Factors and Management

Most of the candidates performed satisfactorily in this question.

#### Common errors and misconceptions

- (a) Most candidates could not differentiate between redistribution and restitution and lacked understanding of the equity schemes as a land reform strategy.
- (b) Many candidates confused management principles with management skills.
- (c) Many candidates were able to mention the risk management strategies but unable to justify how they could minimise the risk.
- (d) Many candidates could not identify and explain the given financial statement. They also experienced difficulty when defining and calculating the net value of the enterprise based on this statement.
- (e) Many candidates simply repeated some of the data in the case studies, which was not necessarily linked to the specific requirements of the question.
- (f) Most candidates did not understand the meaning of an 'asset' so they did not add up the amount that was attributed to the land (R189 000).

#### Suggestions for improvement

- (a) Candidates should be advised on how to approach a question so they respond to what is being asked and use the mark allocation as a guideline on how to answer a question.
- (b) Learners need to be taught what the key verbs such as define, identify, list, discuss, differentiate and compare, mean.
- (c) Teachers should refer to suggestions made earlier in this report, particularly with regard to dealing with the reading required, terminology, language, concepts, graphs, use of previous NSC papers and exposure to different types of questions and case studies.
- (d) Teachers are advised to train learners in specifically identifying what is required in a question. If this is done before the learners start writing class tests, the problem of learners not addressing exam questions should be reduced.
- (e) Case studies, diagrams and scenarios need to be included in assessment tasks given to learners during the school year, in order to expose them to activities that would improve their skills in answering these types of questions. These interventions could assist in improving reading and understanding skills, application of knowledge, and awareness of how to follow instructions.
- (f) Subject advisors should use workshops that are linked to these topics to strengthen the knowledge and skills of teachers and to avoid possible content gaps.

## QUESTION FOUR: Basic Agricultural Genetics

Performance in this question was better than in the previous years although still not as expected.

### Common errors and misconceptions

- (a) Many candidates showed a lack of the skill needed to deduce and interpret facts correctly.
- (b) Some candidates struggled with the calculations of the phenotypic ratios and could not use the Punnett square to indicate the genotypes of the parents. They did not give the phenotype represented by the ratio, but instead used numbers (i.e. 3:1) without explanation of what the ratio stood for.
- (c) Many candidates did not understand basic concepts like heritability.
- (d) Some candidates had obviously prepared their responses based on previous NSC questions. However, this was often inappropriate, as the responses did not necessarily meet the requirements of the question in the 2013 paper.
- (e) Many candidates used their own letters to represent the gametes and not the ones provided for in the question.
- (f) Most candidates could not differentiate between a hybrid seed and a GMO seed and could not provide advantages of genetic engineering. They provided the advantages of a product of genetic engineering such as a GMO crop.

### Suggestions for improvement

- (a) Teachers should give special attention to basic crossing, genetic concepts and terminology in their teaching of this topic.
- (b) Teachers need to strengthen the learners' ability to do the calculations that deal with percentages, fractions, and ratios of the phenotype and genotype of the parents and their offspring in a crossing. Using worksheets and other formative assessment tasks that the teacher could provide can do this.
- (c) Specific classroom attention needs to be devoted to selection methods and techniques. These, together with the different methods of improving the condition of plants and animals with the focus on aim, advantages and disadvantages, must be clearly explained to and illustrated for learners.
- (d) Subject advisors should design workshops to address shortcomings in the content knowledge related to genetics.
- (e) 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 or changed.
- (f) Learners should be discouraged from providing responses learnt by rote without assessing whether the response is valid or not.
- (g) The following suggestions should improve performance in this area:
  - Providing practical examples within the learning site, such as plants, flowers and livestock, could enhance the teaching of genetics;
  - There should also be integration with Life Sciences, as genetics is taught comprehensively in Life Sciences; and
  - The key to mastering basic genetics is the understanding of terminology. Learners should be able to describe concepts and provide practical examples to illustrate them.

## BUSINESS STUDIES

The following should be read in conjunction with the Business Studies question paper of November 2013.

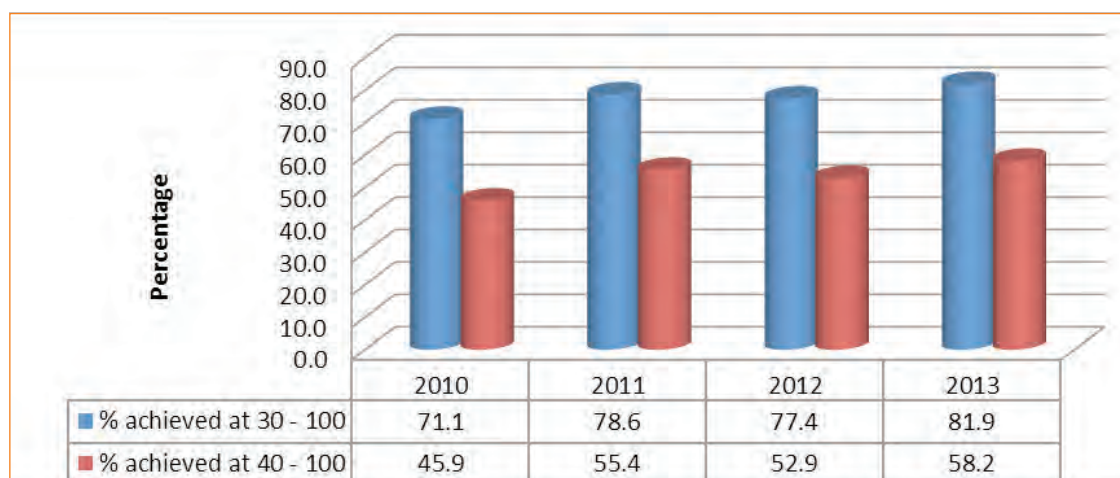
### 4.1. PERFORMANCE TRENDS (2010-2013)

The performance of candidates in the 2013 Business Studies examination reflects an increase in achievement. There was a 4.5 percentage point increase in the cohort of learners who achieved 30% and above, and a 5.3 percentage point increase in the cohort of learners who achieved 40% and above in 2013 compared to 2012. There was also an increase in the number of candidates who have obtained 50% and above. Just under 30 000 new passes were achieved this year, showing that the improved pass rate increases are due to the quality of inputs in the system.

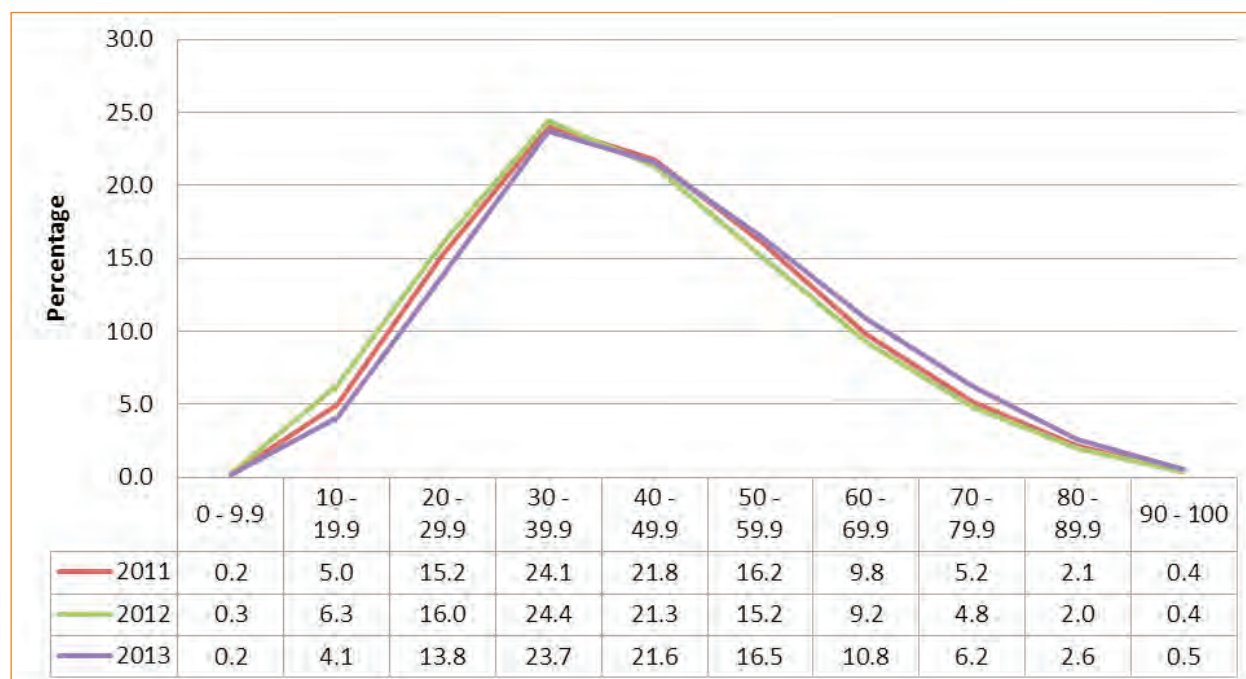
**Table 4.1.1: Overall achievement rates in Business Studies**

Year	No. wrote	No. achieved at 30% and above	% achieved at 30% and above	No. achieved at 40% and above	% achieved at 40% and above
2010	200,795	142,742	71.1	92,259	45.9
2011	187,677	147,559	78.6	104,027	55.4
2012	195,507	151,237	77.4	103,470	52.9
2013	218,914	179,329	81.9	127,422	58.2

**Figure 4.1.1 Overall achievement rates in Business Studies**



**Figure 4.1.2 Performance distribution curves (Business Studies: 2011-2013)**



In 2013, there was a decrease in the percentage of candidates who performed at 0-29% compared to 2012. This is a positive trend, but certain aspects, highlighted below, still pose a challenge.

## 4.2 OVERVIEW OF LEARNER PERFORMANCE

### General comments

- (a) Many candidates misinterpreted questions due to a lack of understanding of the meaning of verbs. Key instructional verbs such as “critically evaluate”, “analyse the impact”, “analyse”, “recommend” and “identify challenges” were problematic. This implies that the language barrier still pose a challenge to many candidates.
- (b) Candidates performed well in Section A (short questions). Their performance in Section B questions showed that they were better prepared in recalling facts than preceding years, but application of knowledge was still problematic.

Many candidates found the analysis of Section C (essay type) questions challenging, although bullets were given as guidance in this regard. The structure (layout) of the essays was slightly better.

- (c) Many candidates relied heavily on the use of previous question papers especially essay type questions and tried to spot which essays will be asked. This resulted in essays that did not address the question.

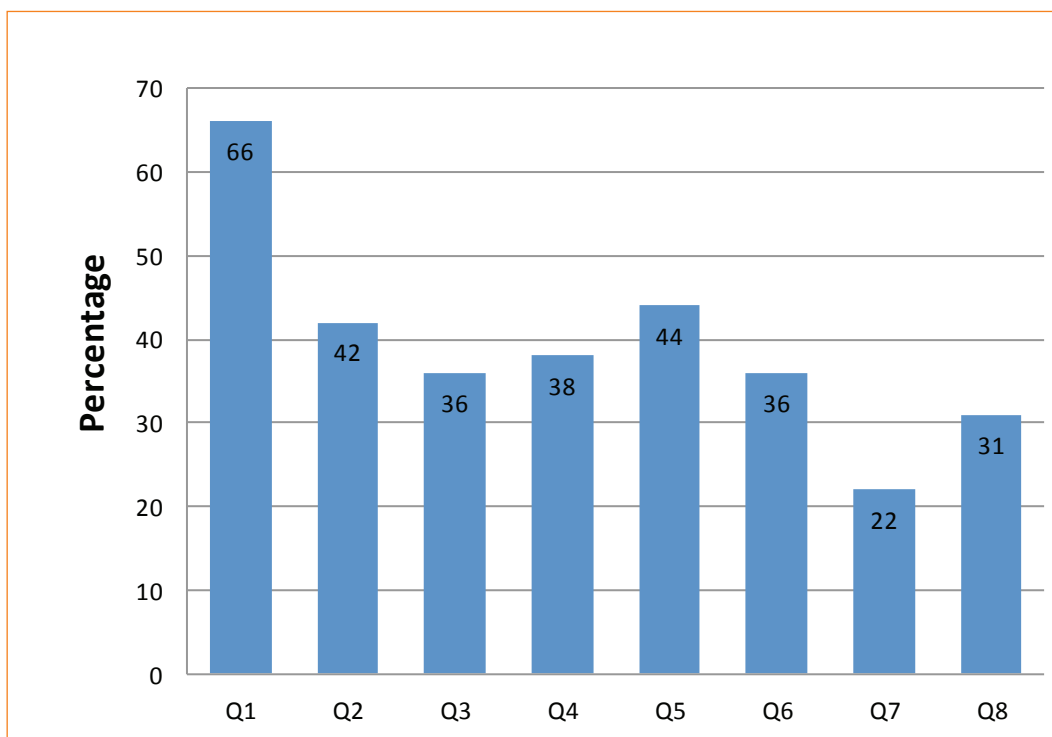
### General suggestions for improvements

- (a) Teaching and learning takes place within the scope of CAPS Annual Teaching Plan (ATP) and CAPS examination guideline and utilise relevant LTSM that addresses the core content outlined in the ATP and Examination Guideline. Teachers should make use of the verbs that appear in the ATP and Examination Guideline in all their formal and informal assessment tasks so that candidates understand the meaning of these verbs to avoid misinterpretation of questions.

- (b) Previous years NSC question papers must still be utilised, as many topics are covered in CAPS. Relevant newspaper clippings, especially those that address the impact of recent legislation on businesses and the latest developments in the subject, should be used to develop questions so that candidates can accumulate resource material that will assist them in preparing for the CAPS examination in 2014.
- (c) Candidates must be given the opportunity to practice essay questions and must be taught how to analyse higher order questions. The same requirements as for grade 12 essays should be taught in grade 10 and 11. Attention must be given to the application of the layout, analysis, synthesis and originality (LASO) as part of essay writing. This could be done by demonstrating essay writing in a classroom so that candidates could ask clarity seeking questions.
- (d) Teachers should be conversant with the “notes to markers” in the memorandum of the 2013 NSC examination as there are some new amendments regarding mark allocation for case studies in section B and synthesis in section C.
- (e) Teachers should be familiar with the structure of the CAPS examination paper from 2014 and refer to the 2014 exemplar. They should refer to circular S7 of 2013 and the Examination Guideline so that they are well conversant with the changes of the structure of the paper with specific reference to Section B of the paper.
- (f) Special attention should be given to Section C essay type questions in the classroom. Candidates should be given at least one essay question per week as part of written homework.
- (g) Subject Advisors may support teachers by drafting a booklet with essay questions. The district subject committee can also help in this regard.
- (h) Teaching and learning should take place within the framework of CAPS (ATP) and the Examination Guideline and not only possible essay questions.
- (i) More practical work on indirect questions should be included in written homework and self/peer assessment could be administered.
- (j) Subject teams, consisting of grade 10 - 12 teachers, could work as an effective unit, who can engage in discussions and plan the teaching of content together, using various resources. They can even design assessment tasks together to ensure that relevant content is taught and assessed before learners come to grade 12.

### 4.3. DIAGNOSTIC QUESTION ANALYSIS

Figure 4.3.1: Average mark per question expressed as a percentage



The average per question in 2013 is lower than 2012 although there was an increase in the learner performance in 2013 compared to 2012.

<b>Q1</b>	Compulsory ( Multiple choice, choosing correct words and matching columns)
<b>Q2</b>	Business environment and business roles
<b>Q3</b>	Business ventures and business roles
<b>Q4</b>	Business operations and business roles
<b>Q5</b>	Pillars of BBBEE and the role the government
<b>Q6</b>	Presentation
<b>Q7</b>	Creative thinking
<b>Q8</b>	Recommendations on the quality of performance based on the challenges from the given scenarios and the quality of performance of the general manager.

## 4.4 ANALYSIS OF LEARNER PERFORMANCE IN INDIVIDUAL QUESTIONS

### SECTION A: MULTIPLE CHOICE/SHORT ANSWER QUESTIONS

#### QUESTION ONE: Multiple choice, choosing correct words and matching

This question was well answered. The majority of candidates achieved 60% and above

#### Common errors and misconceptions

- (a) In Q1.1.1, candidates could not differentiate the procedures related to recruitment and selection.
- (b) In Q1.1.5, candidates did not understand the language used in the question e.g. “telecommunication standards” and “demands of Green Peace” as Vodacom’s willingness to promote environmentally friendly products.
- (c) In Q1.1.10, candidates could not identify the relevant legislation applicable to the question. This challenge is recurring because candidates memorise the legislation without gaining insight hence they cannot apply the knowledge.
- (d) In Q1.2, candidates could not copy their chosen answers correctly, e.g. some candidates wrote “succession” instead of “succession planning” thus losing 1 mark.
- (e) In Q1.2.1, candidates could not distinguish between insurance and assurance. This has been a challenge for a long time.
- (f) In Q1.3.4, candidates confused balanced scorecards with a scoring system used to measure the compliance of businesses with BBBEE.

#### Suggestions for improvement

- (a) Candidates should be taught to recall AND apply the recruitment procedures to case studies and scenarios on human resources processes and procedures. Simulations can be used to demonstrate how the steps in the recruitment procedure can be applied logically and in the correct sequence.
- (b) With regard to environmental protection initiatives, focus on the application of concepts in a business environment and use newspapers and magazines on businesses that strive to greenify the environment. It is also advisable to use vocabulary trees in the classroom to help provide context to concepts, e.g. “Greenpeace: an international independent campaigning organization that uses peaceful direct action and creative communication to expose global environmental problems”.
- (c) In teaching legislation, be conversant with the impact of recent legislation on businesses and encourage the application of knowledge. For example “define the legislation and explain how each legislation impacts on the success/positives or failure/negatives of the business.
- (d) Focus on multiple choice, choosing the correct word- and matching columns-questions during the year. Do not only revise Section B and C type questions. Give candidates such questions from past question papers on a regular basis.
- (e) With regard to insurance, focus on both the terms “insurance” and “assurance”. Seemingly more focus is placed on insurance only, but it is important that candidates clearly understand the difference between these two terms. Insurance is a short term cover that protects the insured against possible losses, while, assurance is a long term policy that guarantees a lump sum of payment if the insured dies/reaches a certain age.

- (f) Include objective type questions and assess business studies concepts in the informal and formal assessment tasks. Emphasis should be placed on the importance of accuracy, especially where answers have to be correctly copied from the question paper, e.g. in section A where candidates had to choose the answers from those given.

(Note: *Balanced scorecard is excluded from the 2014 Grade 12 content*)

- (g) Subject Advisors should draft a “Section A questions” document based on main topics and subtopics. Teachers can use this to do revision throughout the year.
- (h) Curriculum support at schools should be provided by the HOD, who should moderate assessments prior to being written (pre-assessment moderation) to ensure that Section A questions are included in tests and where requirements are not adhered to, provide the necessary support.

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

### **QUESTION 2: Business Environment and Business Roles**

The performance of most of the candidates in this question was reasonable in the sense that it varied from average to good marks. Despite this performance, there were some sub-questions which posed a challenge to candidates.

#### **Common errors and misconceptions**

- (a) In Q2.1, candidates did not supply the full term for a full two marks per fact, e.g. “supplier” only, instead of “power of supplier”. This cost them one mark per fact. Some candidates also confused Porter’s Five Forces with the elements of the market environment.
- (b) In Q2.2, candidates were required to list areas of focus for Corporate Social Investment (CSI). The majority of candidates were confused with this question and discussed benefits of CSI for the community and/or business. This is because this question is new and candidates used past NCS examination papers for revision.
- (c) Q2.4 was poorly answered, because candidates could not distinguish between the different types of strategies.

This question has always been a challenge to most of the candidates even though business strategies have been assessed many times and the information is available in the marking guidelines of past papers.

- (d) Q2.5.1 was generally well answered by the majority of candidates. Some candidates confused weaknesses and threats. Other answers were too general which indicated that candidates did not extract aspects for the SWOT analysis from the case study as was required.
- (e) Q2.5.2 was new and required application of knowledge. Candidates could not respond clearly to this question as they could not explain the impact of this Act on businesses. The responses were based on the definition and the purposes of the Act.
- (f) In Q2.6, candidates did not fully justify each factor when choosing a career. They simply named the factors and lost full marks. It seems as if they did not understand the meaning of “Justify”. Answers given were quite varied.

#### **Suggestions for improvement**

- (a) Encourage and motivate candidates to give answers in full sentences where needed. This must be done from grade 10.



- (b) With regard to Corporate Social Investment (CSI) focus areas, Practical examples should be used in class when teaching the subject. Projects or assignments as either informal or formal assessment, especially on CSI should also include practical examples
- (c) Business strategies must be taught in detail as indicated in the Examination Guideline and relevant examples of each strategy given. Teachers must also make use of the past NCS examination papers and marking guidelines as resource material for this topic.
- (d) Use scenarios/case studies to illustrate how to conduct a SWOT analysis. Remind candidates that strengths and weaknesses are found within the business, while opportunities and threats are external to the business. Other industrial analysis tools should be taught in the same way. Focus on applying it to given scenarios/case studies. The industrial analysis tools used in the strategic planning process include the SWOT analysis, Porters Five Forces and PESTLE. This is covered in detail in CAPS as from 2014 and candidates must know how to apply these tools to analyse the forces of the external environment.
- (e) Teachers should ensure that they have all the Acts and should study them. They should also strive to keep abreast with latest developments in terms of amendments in some Acts e.g. study the new BBBEE and EEA amendments and its impact (positive and/or negative influence) on business operations. Debates should be used as a form of informal assessment to develop candidates' critical thinking and research skills. Subject Advisors should determine curriculum support needs and conduct workshops with a view to improve content knowledge and critical thinking skills of learners.
- (f) Explain the meaning of cognitive verbs in detail to candidates. Candidates must know exactly what is required in their responses. This should be done from grade 10. Teachers should gather examples of cognitive verbs from previous question papers and apply these in class activities and informal/formal assessment. Use previous papers' memoranda to illustrate what answers are expected for the various verbs.

### QUESTION 3: Business Ventures and Business Roles

This question was poorly answered. There were new sub-questions that required the application of knowledge.

#### Common errors and misconceptions

- (a) Q3.1.1 was well answered, even though some candidates did not refer to the characteristics of an entrepreneur from the case study.
- (b) In Q3.1.2, candidates did not know the meaning of companies "going public" because they are used to the term "listing"
- (c) Q3.1.3 was well answered, although some candidates repeated the answer given in 3.1.2. Some responses were as if the business had amalgamated with JSE.
- (d) Q3.2 was a new question that required candidates to discuss human rights issues that businesses should promote in the workplace. The responses were on human rights in general and not specific human rights issues in the workplace. Candidates also confused 3.2 with 3.4 as these questions appeared to be similar.
- (e) In Q3.3.1 & 3.3.2, calculations are still a major problem to many candidates. They do not know the formula and therefore cannot calculate the interest. Another major challenge was that candidates could not differentiate between simple and compound interest.

- (f) Q3.4 was not tested in past papers, hence candidates performed poorly. Some candidates wrote correct headings, but could not give an explanation, e.g. fair pricing only, with no explanation. They also gave the characteristics from the King Code that was not related to this question. Candidates confused ethical business conduct with unethical conduct.
- (g) Q3.5 was not asked in past papers. Candidates approached this question as if they were to explain how a leader's personal attitude should be, whereas the question required an explanation on how a leader's personal attitude influences his/her success in a business. Some candidates wrote about leadership styles.

### **Suggestions for improvement**

- (a) Candidates should be encouraged to read and understand the instructions given in the questions. This can be achieved by ensuring that assessment activities given to candidates as class work or homework include case studies and scenarios.
- (b) Recap the procedure for the establishment of the public company which was done in grade 11. Candidates must know that the public company needs to comply with the requirements for registration before it is listed on the JSE and indicate that "going public" is similar to "listing" as both terms are used when the public company is allowed to sell shares to the public on the JSE.
- (c) It is recommended that the memoranda of past papers should be used to supplement class notes and/or LTSM, as the functions of the JSE were assessed many times. Key terminology used in the functions of the JSE must be explained in detail and relevant examples should be given to support explanations in class.
- (d) With regard to human rights in the workplace, teachers should clearly identify and list the human right issues applicable to a business and which should be upheld/promoted in the workplace. Supply candidates with relevant examples of each human rights issue in the workplace. Administer informal tasks that require candidates to assess business policies on human rights.
- (e) Candidates should be given more opportunities to do calculations and must stress the formulas. When answering this type of question, candidates must start with the formula and then do the actual calculation. Ensure that candidates understand the difference between simple and compound interest. The Accounting or Mathematical Literacy teachers can be requested to assist in teaching calculations.
- (f) Candidates should be taught how to identify and explain all the professional, responsible and ethical business practices as outlined in the Examination Guideline. Then combine them with applicable characteristics from the King Code. Candidates should also be able to justify how these characteristics guide businesses to behave ethically and professionally and apply ethical and professional business practices to practical examples/scenarios.
- (g) The role of personal attitude for the success of a leader in a business forms part of the aspects to be taught in management and leadership (see the Examination Guidelines) Practical scenarios should be used to illustrate application when teaching this topic.

## QUESTION 4: Business Operations and Business Roles

Candidates' performance on this question was poor. Some sub-questions were higher order questions and required learners to apply critical thinking.

### Common errors and misconceptions

- (a) In Q4.1.1, candidates were unable to distinguish between protected and unprotected strikes. Some candidates referred to the police shooting at Marikana and said it was an unprotected strike. Protected and unprotected strikes were confused with the general concept of protection e.g. by police, trade unions and court must give permission.
- (b) In Q4.1.2, candidates lost marks as they related their responses to the case study and should rather have responded by outlining the grievance procedure. Some candidates provided problem solving steps, while others discussed strikes. This question has been assessed many times, but it still poses a challenge especially when scenarios and case studies are used to assess knowledge and insight of the grievance procedure.
- (c) In Q4.2.3, candidates did not expect a question on fringe benefits, since it is not clearly indicated in the current Examination Guideline. This was a higher order question for most candidates. Some clearly did not understand the concept of fringe benefits. No examples were given by candidates in their motivation. Many of their responses were focused more on what benefits the employee can receive, rather than the obligation of employer.
- (d) Q4.3.2 was poorly answered, because candidates could not evaluate the employment contract in the scenario. They wrote other aspects of the contract that were not included in the scenario. Candidates also mixed the evaluation and recommendation "portions" of the answer and did not indicate each part of this question separately. It is also evidently clear that some candidates have little understanding of the action verbs "Critically evaluate."
- (e) In Q.4.4, candidates recommended CCTV cameras, a dress code, and that male and female workers must be separated at work. Many candidates saw relationships at work as sexual harassment.

Some candidates only associated sexual harassment with rape and then discussed rape only. Candidates also mixed the explanation of sexual harassment with the proposal for improvement instead of answering each part of the question separately. This question has been asked in past papers in both Section B and C. However, it still remains a challenge for many candidates.

### Suggestions for improvement

- (a) With regard to strikes, candidates must know that strikes are to be in line with the Labour Relations Act. This will determine whether the strike is legal or not. Focus on the wording legal (protected) and illegal (unprotected) strikes to answer this type of question.
- (b) Distinction should be made between problem solving and grievance procedures. Case studies and scenarios should be used when teaching these topics. Teachers can also use role play to assess whether candidates understand grievance procedures or not.

- (c) Fringe benefits form part of a worker's contract and should be included when teaching the human resource function. Ensure that candidates understand the meaning of "Do you think."-questions as it only requires a positive OR negative OPINION, and a "yes" or "no" response MUST be followed by an applicable opinion. ("Yes" or "No" responses only, do not score any marks).
- (d) Candidates knew the contents of an employment contract, but have a problem applying it in practice/ scenario. Give more scenarios to candidates when teaching an employment contract. Ensure that candidates fully understand the contents of the Basic Conditions of Employment Act as it forms part of the employment contract.
- (e) Subject Advisors can invite a business labour officer and a labour union officer to address teachers on labour issues and procedures. Subject Advisors must determine curriculum support needs and conduct workshops with a view to improve content knowledge.

## **SECTION C: ESSAY QUESTIONS (Candidates had to answer any two of the four questions)**

### **QUESTION 5: Pillars of BBBEE**

This was a popular question answered by the candidates. The performance of the candidates was average.

#### **Common errors and misconceptions**

- (a) Candidates managed to identify the pillars of BBBEE but explained the aims of pillars instead of analysing the impact of these pillars on businesses.
- (b) Candidates discussed the Employment Equity Act and Skills Development Act instead of Skills development and Employment Equity as part of the pillars of BBBEE.
- (c) Discrimination against and the inclusion of women, disabled people was repeated excessively. This forms part of the definition of BBBEE Act, but not the pillars.
- (d) The role of government in promoting BBBEE was not discussed by a majority of candidates as the question was phrased differently than previous years and candidates did not understand the meaning of "role of the government in promoting this Act".

#### **Suggestions for improvement**

- (a) It is significant that teaching legislation should centre around the implication of legislation on businesses. Teachers should explain the meaning of pillars and critically analyse its implications (positive or negative impact) on businesses. It is imperative that candidates are well conversant with the new BBBEE and EEA amendments and its implication on businesses.
- (b) Newspaper articles relating to relevant legislation should be used to ensure that candidates understand instead of memorising the pillars without relating to their impact on businesses.
- (c) Use practical examples of businesses that are BBBEE compliant. Let candidates do an investigation/summary/ report on how businesses comply with the BBBEE Act as well the benefits of compliance. Many such examples appear in the business section of newspapers.
- (d) The role of the government in promoting the Acts should be taught in detail. This is outlined in CAPS as from 2014 as there are penalties for non-compliance.

## QUESTION 6: Presentation

This was a popular question, but the performance was not good. Parts of the question were answered very well, but other parts of the question could not be answered at all.

### Common errors and misconceptions

- (a) Candidates combined/mixed the preparation and feedback aspects in one paragraph even though the questions were in bullet form.
- (b) Candidates did not read, analyse and interpret the question correctly. Some wrote about the business plan instead of the presentation of the business plan.
- (c) Many candidates only explained the criteria that the presenter should focus on during the actual presentation.
- (d) Candidates mostly named the methods of presentation only, instead of evaluating each one as a “good” or “bad” method for the presentation.
- (e) Learners assumed that John’s presentation did not go well and they should advise him on how to improve.

### Suggestions for improvement

- (a) A clear distinction should be made between the factors that must be considered when planning for a presentation and how to handle feedback in a professional manner. Candidates should know that feedback is obtained once the presentation has been presented.
- (b) The presentation of business related information should be covered adequately in Grade 10, 11 & 12 and it should be assessed both formally and informally so that candidates are exposed to all aspects of presentation.
- (c) Candidates should be given the opportunity to do actual presentations in class, assessed by peers using a rubric. Criteria may be the aspects of a presentation as prescribed in the syllabus.
- (d) School management teams should support teachers when they organise presentations in class, by providing relevant materials and equipment required.

## QUESTION 7: Creative thinking and Problem solving

This question was poorly answered because it was a new question asked in section C. This was a least popular question in Section C.

### Common errors and misconceptions

- (a) Many candidates only gave a general definition of creative thinking instead of focusing on its actual role in solving complex business problems.
- (b) **Many** candidates gave a general definition/explanation of the Delphi and brain-storming techniques, instead of focusing it on JCM (in the scenario). Therefore they did not evaluate these techniques.
- (c) Candidates did not identify barriers that could prevent JCM from solving problems. Some mentioned external barriers and wrote a lot about workers' personal issues as barriers.
- (d) Some candidates were unable to answer the different parts of this question. Creative thinking and problem solving techniques need attention.
- (e) Although candidates were guided by the phrasing/bullets of the question, they were not able to answer certain parts of the essay correctly due to insufficient knowledge about the topic.

### Suggestions for improvement

- (a) Include real life case studies/scenarios on problem solving in businesses in formal and/or informal assessment.
- (b) Ensure that candidates are able to apply the problem solving techniques in practical situations.
- (c) Use challenging case studies from various sources that candidates can apply to solve complex business problems. Candidates should be encouraged to evaluate each technique used in each case study.

## QUESTION 8: Recommendations on the quality of performance based on the challenges from the given scenarios and the quality of performance of general management

This question was poorly answered because candidates could not analyse the scenarios and make relevant recommendations.

### Common errors and misconceptions

- (a) Candidates confused this question with either the challenges in the business environments and the quality of performance of business functions because the phrasing of the question was different from previous years.
- (b) The format of the question was not the usual one as in past papers. This question was of a high cognitive level. Candidates were not able to recommend ways in which this business can improve the quality of performance in each of the mentioned challenges.
- (c) Some candidates discussed quality of performance of the general management (the second part of the question) and ignored the first part of the question.
- (d) Candidates did not interpret the question correctly. Many candidates explained the business functions, instead of referring to improving the quality of performance.

- (e) Candidates changed the challenges to business functions and described these functions instead of answering the question.

### **Suggestions for improvement**

- (a) Teaching and learning should focus on the quality of performance and how to improve it for ALL the business functions.
- (b) There should be a thorough discussion of the activities performed in each business function using practical examples to enhance understanding.
- (c) Candidates should be trained to analyse higher order questions e.g. use possible challenges in each business function and link possible strategies that businesses may use to overcome those challenges. Candidates should also be encouraged to devise their own strategies/ideas to build their confidence in forming their own opinions. These types of “exercises” should be applied regularly and may also be applied to other topics of the 2014 syllabus.

## ECONOMICS

The following report should be read in conjunction with the Economics question paper of the November 2013 Examination.

### 5.1 PERFORMANCE TRENDS (2010 – 2013)

The number of candidates in Economics has increased over the last three years. The performance of candidates in the 2013 Economics examination is consistent with the 2012 performance even though 15 745 more candidates wrote the examination in 2013. There is a slight increase in the percentage (1.1%) of learners who achieved 30% and above as compared to 2012 but the number of learners who achieved 40% and above decreased by 0.5% since 2012. The percentage of candidates achieving distinctions remained consistent with 2012.

**Table 5.1.1: Overall achievement rates in Economics**

Year	No. Wrote	No. Achieved @ 30% and above	% Achieved @ 30% and above	No. Achieved @ 40% and above	% Achieved @ 40% and above
2010	147 289	110 824	75.2	68 164	46.3
2011	133 358	85 411	64.0	44 205	33.1
2012	134 369	97 842	72.8	61 452	45.7
2013	150 114	110 869	73.9	67 795	45.2

**Figure 5.1.1: Overall achievement in Economics**

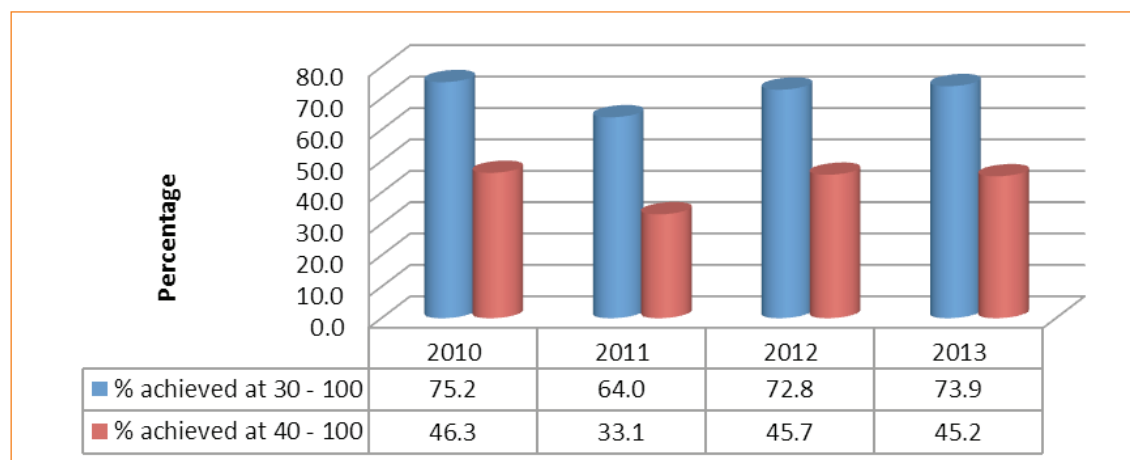
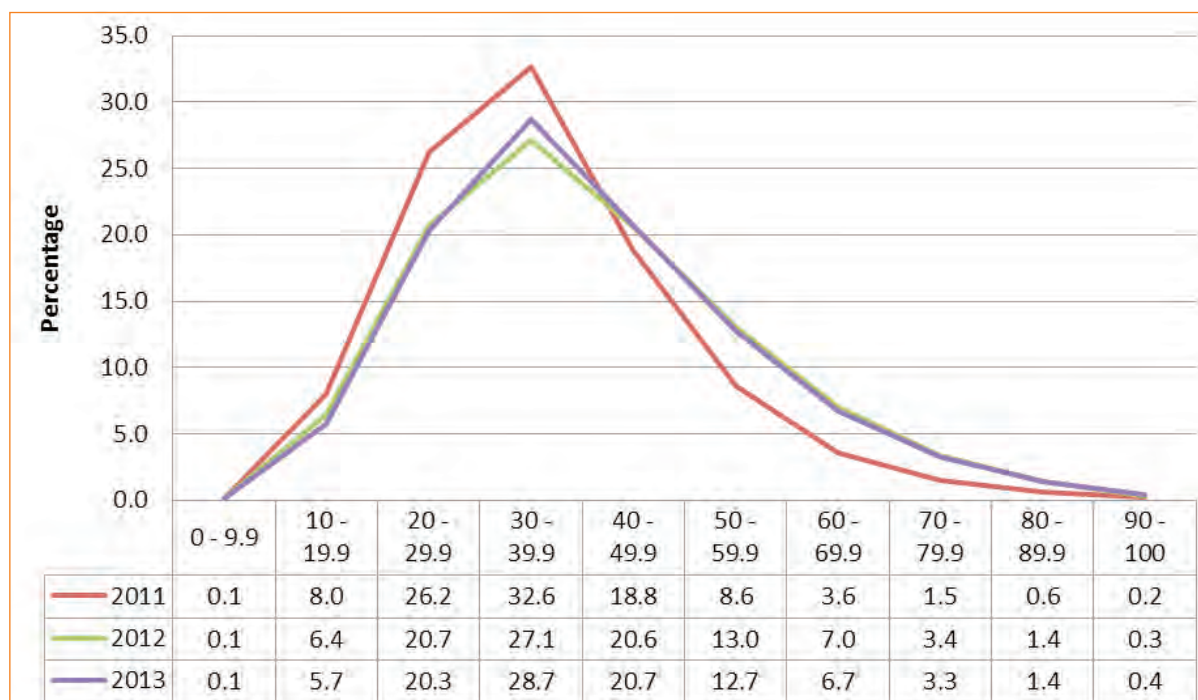




Figure 5.1.2: Performance distribution curves (2010 – 2013)



## 5.2 OVERVIEW OF LEARNER PERFORMANCE

### General comments

- The performance of candidates in this paper reflected an encouraging improvement. It indicates that the 2012 Diagnostic Report for Economics was carefully considered by PEDs for purposes of intervention and assisting teachers and learners in preparation for the final examination. These interventions included the *Mind the Gap* initiative from DBE, which supplied much-needed uniformity in factual content. This enabled candidates in general and the low ability learners in particular to answer the lower order questions that comprised  $\pm 30\%$  of the paper. Improvements in the number of candidates who achieved 30% and above might be due to candidates having used past question papers to prepare themselves thoroughly for the 2013 examination. Many teachers taught the more difficult topics with noticeable success (Refer to Question 7, where learners were asked to evaluate the success experienced by the South African government in the implementation of its fiscal policy. Also refer to Question 8, where the three equilibrium positions were asked accompanied by detailed graphs). It is clear from the results which candidates had been better exposed to questions with graphs, extracts, newspaper articles and figures on a regular basis during lessons.
- It is also evident that many schools / examination centres did not make use of the past papers to prepare their learners. Due to poor proficiency in the Language of Learning and Teaching many candidates continued to demonstrate a lack of comprehension and interpretation skills. This was evident in the answers they provided to the different data-response questions (Section B). Poor essay writing skills was evident in the quality of learner responses in Section C. Candidates should be able to adapt and respond to a variety of questioning techniques in a question paper (Refer to Questions 7 to 10 that involve the writing of essays). Unfortunately, learners were unable respond appropriately to these questions. The poor quality of answers from many examination centres indicates that there are still persistent challenges in the current teaching and learning processes used in Economics classrooms.
- Analysis of the performance of candidates in the 2013 paper shows that the general improvements have resulted from the following:

- **Content coverage:** Candidates from examination centres that performed well had been exposed to the entire syllabus. These candidates were able to make sound choices between questions in Section B and Section C. It is evident that teachers are more confident in teaching the topics and candidates managed their time effectively in preparation for each paper.
- **Exposure to different types of questions:** Teachers play a crucial role in the providing learners with the opportunity to practice with and be able to respond to a variety of questions that measure demonstrable skills and knowledge in a variety of ways. A competent and confident Economics learner is able to transfer his/her writing skills to the construction of essays and paragraphs so that he/she is able to present his/her opinions with confidence. The learner must be able to select and focus specifically on the information that is relevant to the answering of each question.

**Language ability:** Although language proficiency (LOLT) is still a drawback for many second-language candidates, many examination centres in deep rural areas have achieved excellent results compared to others experiencing similar language challenges. Teaching methodologies should facilitate optimal understanding of subject content by all learners and examples of higher-order questions should be discussed with learners in the correct context of the subject content being taught, and they should be given adequate practice with such questions to supplement their skills and knowledge mastery.

### General suggestions for improvement

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

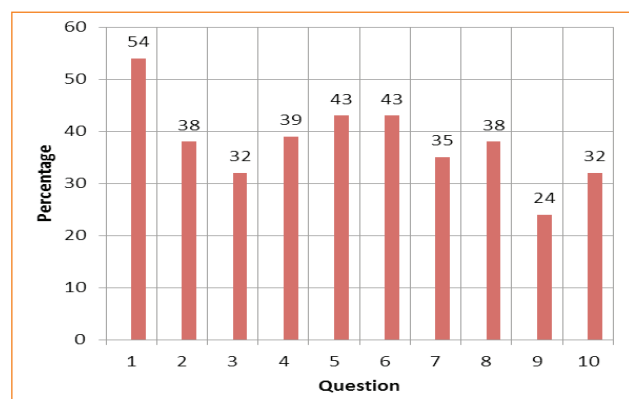
- Use of past NSC papers:** In preparation for the 2014 year-end paper, learners should use past final and supplementary papers **selectively**. Teachers can build their own confidence to deal with different topics in the classroom and assist learners by supplementing their teaching with judicious reference to past exam papers. Please note that the format of Economics examination papers changes substantially from **ONE x 3 hour paper** (2013) to **TWO x 1½ hour papers** (2014). Teachers should also use the *Examination Guideline 2014* as a supplementary resource in terms of the scope and depth of CAPS content and how to assess learners on the specific content matter.
- Basic concepts:** Teachers should ensure that learners know and understand all essential basic concepts and terminology before engaging in the application of them. Creative strategies, classroom activities and exercises that encourage and build the reading skills of second-language learners should be incorporated into lessons.
- Requirements of questions:** Teachers should ensure that learners know and understand how they should respond to typical questions in future NSC (CAPS) papers. For example, if a question requires a graph or figure to be provided as part of the explanation, this must be done for the candidate to earn the relevant marks for that question. Learners must be familiar with the basic structure and layout of questions and must know where to find relevant information on a source provided. Learners should be adequately prepared to respond to the cognitive demand of a question. (Please refer to Section B where ‘*own opinion*’ involves higher-order evaluation skills based on data given in the extract, graph or table.)
- Comments and explanations:** Teachers need to prepare learners to express themselves clearly where comments or explanations are required. Learners need guidance on how to express their own opinions that are relevant within the context of a specific question. Refer to *Examination Guidelines 2014* where typical ‘hot’ questions are provided e.g. *Explain how fiscal and monetary policy might be used to stimulate economic activity during a recession* (page 10) **OR** *Link the operation of financial and foreign exchange markets to the other participants of the circular flow* (page 8).

- (e) **The importance of formative testing:** Teachers should build the confidence of learners in regard to all topics through the use of regular, relevant, short, informal formative tests and tasks. Short, formative assessment tasks should be used to ascertain whether candidates are able to apply their knowledge, and express or emphasise their own opinion and understanding. This will assist and prepare learners to take ownership of the learning process (see *Examination Guidelines* (page 12): *Identify how social rights are embedded in the budgets of the South African government*).

Q1	All Learning Outcomes
Q2	Macroeconomics
Q3	Microeconomics
Q4	Economic pursuits
Q5	Contemporary Economic Issues
Q6	Macro- and Microeconomics
Q7	Macroeconomics
Q8	Microeconomics
Q9	Economic pursuits
Q10	Contemporary Economic Issues

### 5.3 DIAGNOSTIC QUESTION ANALYSIS

Figure 5.3.1: Average marks per question expressed as a percentage



### 5.4 ANALYSIS OF LEARNER PERFORMANCE IN INDIVIDUAL QUESTIONS

#### QUESTION 1: Microeconomics

The performance of learners in this question ranged from excellent to poor, where some candidates got full marks whilst others did not even attempt to answer the question. A pass mark for this question usually indicates that the candidate was adequately prepared for the examination paper as a whole.

#### Common errors and misconceptions

- (a) The multiple-choice questions in Question 1.1 were answered fairly well, although some candidates preferred to leave blank spaces when they were not certain of the answers. In many instances, this led to the incorrect numbering of questions.

- (b) In Question 1.2, candidates had to identify an Economic term from a given statement. Overall, the performance in this sub-section was poor. Candidates could not distinguish between 'global warming' and 'globalization'. Most candidates wrote foreign exchange instead of free floating. Candidates did not provide the full name of the act and wrote only the word 'Employment' instead of 'Employment Equity Act'.
- (c) In Question 1.3, most of the candidates performed fairly well. Some candidates did not cancel an incorrect choice. In some cases, they left out certain answers by mistake. Some candidates changed their original answers by writing the final answer over the first one – making it impossible to read, or they provided more than one response, e.g. C / A. Generally a lack of content knowledge impaired performance in this question.

### Suggestions for improvement

- (a) Question 1 provides a clear indication of the knowledge of candidates and includes all four learning outcomes equally. With regard to Q1.1, learners should write only the letter (A, B or C) of their choice next to the question number. If they prefer to write the answer out in full, they should not leave out any part of the answer, otherwise it is incorrect. Learners should first determine what the answers are before they look at the three distractors to make their choice. Short formative tests on basic concepts are advised. The structure of Section A should be explained to learners to enable them to organise their answers properly. Adhering to instructions can make the assessment more accessible for the learner. Leaving lines blank between sub-sections, using the correct numbering system, and not omitting question numbers are examples of responses in which learners need more preparation for them to do better in this question.
- (b) The importance of knowing subject terminology well cannot be over-emphasised. Teachers should expose learners to a variety of short questions to build their confidence in answering Question 1.2. A quiz bowl can be an interesting tool to assess knowledge of economic concepts. Classwork or homework on definitions would ensure that learners stay familiar with these basic concepts. A general improvement in the performance of learners in this section serves as a very strong indication that good attempts were made in exposing learners to basic economic concepts. Refer to *Examinations Guidelines 2014*, where it is stipulated that '*matching*' questions will be allocated ONE mark each in future exam papers.
- (c) Learners should be exposed to a variety of short questions to build their confidence in answering Question 1. The correct use of Economics terminology must be adhered to. The names of Acts and organisations should be written out in full at all times. This question covers the whole curriculum and tests recall and comprehension. Although multiple-choice questions provide the alternatives, it requires full content knowledge for learners to select the correct answer. The confidence of learners should be built by spending more time on understanding economic terminology, definitions and concepts to ensure expansion of knowledge of the vocabulary of the subject. Continual testing of terminology is strongly advised. Since it reflects in the quality of answers, difficult topics should not be avoided. From 2014 '*identify the concept*' questions will be allocated ONE mark each in future exam papers.
- (d) Regular, adequate support to teachers via visits, meetings and in-service training sessions by subject advisers and subject specialists is very important. Difficult topics should be the focal point of discussions during training e.g. the multiplier, compilation and analysis of various graphs; how to set standardised questions on data base questions, essay topics, how to interpret the examination guideline, how to use *Mind the Gap* and different study methods.

### QUESTION 2: Macroeconomics

The performance of learners on this question ranged from very poor to excellent.

## Common errors and misconceptions

- (a) A few candidates could not differentiate between terms of 'trade' and 'balance of trade' in Q2.1.
- (b) Many candidates gave the factors influencing the demand for foreign exchange instead of the factors influencing supply of foreign exchange in Q2.2.
- (c) Due to a lack of basic knowledge of content, candidates failed to interpret and explain the message conveyed by the cartoon in Q2.3.2. They struggled to debate issues and merely provided words from the cartoon without any attempt to critically link the questions to the cartoon.
- (d) The extract on the Balance of Payments in Q2.4 was poorly answered. Some candidates could not define 'Balance of Payments', nor calculate the balance on the current account correctly. Many candidates failed to give a reason for the change in the trade balance. It was clear that candidates were unable to make use of the information already provided to answer questions appropriately.
- (e) Candidates were unable to explain how the government would apply fiscal and monetary policies to smooth business cycles (Q2.5). Most candidates got zero to four marks for explaining only the demand-side. The phrasing of the question may have confused candidates as most answered the question on the demand-side only by concentrating on monetary and fiscal policy and ignoring the supply-side approach. A common error was that candidates were unable to explain how the two policies should be used by government; instead, candidates only mentioned or discussed the instruments.
- (f) Some candidates confused 'privatisation' with 'nationalisation' in Q2.6. Many candidates explained the reasons for public sector failure rather than explaining the problems of public sector provisioning. Translation of terms caused problems for candidates e.g. 'rekenplichtig' was used instead of 'aanspreeklik' – as used by most textbooks.

## Suggestions for improvement

- (a) 'Terms of trade' has been covered as topic in the past, causing candidates to expect it to be repeated in the 2013 question paper. .
- (b) Differentiation between two topics should be taught in tabular form to make the differences clear. Refer to *Examination Guidelines 2014* for changes affecting short items.
- (c) Learners should know how to evaluate and analyse issues dealt with in data based questions. From Grade 10, learners need to be adequately exposed to data response items on current economic events during informal and formal assessment, as they still transcribe the information noted on the cartoon rather than give the correct responses that indicate their own understanding. These skills should be developed and enhanced in earlier grades to reduce the amount of revision time required on data response items in Grade 12. Learners should better prepared in the interpretation of cartoons and they should be taught how to use all the information in the cartoon to determine the message that is meant to be communicated to the reader.

There is a clear shift towards 'own opinion' as part of data response questions (Q2.3 and 2.4). Where a question counts 2 (2 x 1) or 4 (2 x 2), candidates should provide TWO answers to get full marks. A variety of cartoons, extracts from newspapers and magazines and graphs/tables should be used and discussed during class time. Learners should be exposed to current economic issues and should be guided in their approach to answers which are dependent on knowledge of current issues. Team teaching, workshops and outsourcing to specialists (e.g. inviting subject specialists to assist) should be encouraged.

- (d) Candidates who failed to give a reason for a change in the trade balance were unable to distinguish between the impact exports and imports have on the trade balance, hence most of them said that exports were greater than imports. This showed a clear lack of insight and basic knowledge. A detailed study of the balance of payments, its components and calculation thereof is required of all learners. A clear distinction should be drawn between the inflows and outflows and their impact on the Balance of Payments.
- (e) Candidates should read questions carefully to determine what is expected from them. They had to discuss how the fiscal and monetary policy instruments are used to slow the economy down at a peak and to stimulate the economy at a trough. This should promote a discussion of contractionary and expansionary measures. When discussing this matter, candidates are advised to explain the two extreme points on business cycles, i.e. the trough and the peak.

Learners should be exposed to advanced paragraph-type questions and be guided on how to express their opinion and to support or motivate their responses if required to do so. Learners should be fully exposed to the fiscal and monetary policies of South Africa and elsewhere. Emphasis should be on using the *Examination Guidelines* and other policy texts to enhance quality of learning and teaching – documents which clearly indicate the content that should have been dealt with in detail. The topic on the smoothing of business cycles should be simplified in discussing the fiscal and monetary policies by using the two extreme points of the business cycle as starting points i.e. the peak and trough. The explanation should focus on the expansion or contraction of the economy by using these two instruments.

- (f) A clear distinction should be drawn between privatisation and nationalisation. Learners should be guided in their understanding that there is a vast difference between the problems of public sector provisioning and the reasons for public sector failure. Refer to *Examination Guidelines 2014*, where it is stipulated that in future papers candidates could be required to deal with both topics in detail. It is important that candidates first discuss a topic before they add examples. The learners should be equipped to use the correct (alternative) terminology (used and applied by the language editors who are guided by the latest subject-related dictionaries).
- (g) It was encouraging to see candidates attempting all questions and responding correctly to some. This indicates a definite increase in the level of understanding of those sitting the exam. If challenging topics are avoided, it is reflected in the quality of answers. Teachers should refer to the new *Economics Examination Guidelines 2014* and *Mind the Gap* (CAPS) to enhance effective teaching and learning. The lay-out of the guideline is such that everyone will know exactly which topics should be dealt with in more detail or when a broad outline is required.

Note the shift of protection and free trade (globalisation) from the third to the first main topic.

### QUESTION 3: Microeconomics

Learner performance on this question ranged from poor to fairly good. Most candidates found Q3.1 straightforward and fair.

#### Common errors and misconceptions

- (a) Question 3.2 on the characteristics of an oligopoly was answered poorly by most learners. A lack of basic content knowledge of market structures was noted.
- (b) Candidates performed poorly in Q3.3. The questions proved to be difficult and candidates tended to select their answers from the extract without applying content knowledge. Candidates failed to interpret the message in the pictures within an economic context. Lack of basic content knowledge of market failures was evident as candidates failed to define market failure correctly. Some candidates confused market failure with public sector failure. In Q3.3.2, candidates failed to label their responses appropriately as A or B and forfeited the marks.

- (c) The data response question on monopolistic competition showed a poor to average performance. Candidates performed poorly because if they failed to identify the correct market structure in Q3.4.1, all responses in subsequent questions would be incorrect.
- (d) Question 3.5, on the key institutions that regulate competition was answered poorly. Many candidates left this question unanswered, provided discussions without headings or were confused about the institutions, e.g. Tribunal Competition instead of Competition Tribunal, Appeal Competition Court instead of Competition Appeal Court. Many problems still exist in the teaching of *Microeconomics* and this might be the main reason for the poor performance of candidates.
- (e) Candidates performed poorly in Q3.6 and explained the characteristics of monopolies instead of how natural and artificial monopolies act as barriers to enter the market.

### Suggestions for improvement

- (a) Learners should engage with topics on the prescribed content. Regular class tests and informal assessment can be of great help. A rigorous analysis of the various topics is needed to ensure that all relevant content is covered. When assessing learners on specific topics, the *Examination Guidelines 2014* should be used. This will enable them to ensure that core content is understood and assessed. The order in which the content should be taught has changed. Market failure will be discussed after the perfect and imperfect markets.

Learners should be provided with various examples of different types of short questions that could form part of the question paper. Content should be taught in much more detail. There should be variety in modes of assessment in the classroom. Key words and their requirements should be dealt with in detail, e.g. 'explain', 'discuss' and 'identify'. Learners should attend to their handwriting, and to the labelling and numbering of questions. They should be informed about the changed format of the question papers for 2014. A clear distinction must be drawn between various characteristics of market structures. Learners should be exposed to different market structures in line with the *Examination Guidelines 2014* and other policies. In *Mind the Gap (CAPS)*, the explanation of graphs is simplified and easy to understand. Revision of Grade 11 graphs is also included. Differences between profits and losses in the short and the long run must be emphasized (see *Examination Guideline 2014* page 19 for further details).

- (b) Learners should be better prepared on specific topics. Public sector failure forms part of Macroeconomics (Question 2), whereas market failure forms part of Microeconomics (Question 3). Each question in Section B focuses on a specific topic. Candidates should be able to discuss the causes and consequences of market failure in detail (see *Examination Guidelines 2014* page 22).
- (c) Microeconomics needs to be taught in much more detail. Candidates applied too much general knowledge instead of using relevant economics terminology. It is clear from responses that candidates need thorough practice in the interpretation of data- response questions. Learners should be exposed to different market structures in line with the *Examination Guidelines 2014* and other relevant policies. Lack of basic content knowledge was noted – it is therefore critical that the content from Grades 10 to 12 be addressed in full.

- (d) The content is not taught in enough detail. Poor answers in Q3.5 and Q3.6 show that this content is either not taught or not taught well enough. Learners' responses show a serious lack of knowledge of the topic. Candidates should read questions carefully to determine what is expected from them, e.g. the aims of competition policy was discussed instead of the roles of key institutions that regulate competition. Insufficient variety in assessment done in the classroom might be the reason. The same topic should be asked as a paragraph, in the context of a data base or in the form of a short question. A serious shortage in teacher development and practical assistance from subject advisers might be factors preventing centres from achieving better results. The *Examination Guideline 2014* should be used when planning lessons. This will ensure that all topics are taught according to the relevant cognitive levels. Please note changes to the *Examination Guidelines 2014* on this topic: description, goals, anti-monopoly policy and competition policy (that addresses the Competition Commission, Competition Tribunal and Competition Appeal Court) as a brief discussion or analysis.

#### QUESTION 4: Economic Pursuits

The general performance of learners in this question ranged from very poor to fair. Most candidates earned marks for the two lower-order questions (Q4.1 and Q4.2). There were major differences in performances between districts, circuits and schools.

#### Common errors and misconceptions

- (a) Many candidates misinterpreted questions. Instructions such as '*differentiate*', '*evaluate*', '*interpret*' and '*analyse*' were disguised by '*what*', '*why*', '*which*' and '*how*'.
- (b) Candidates who did not perform well could not interpret the graph correctly and failed to explain the term, 'poverty line'. Candidates could not associate content learnt with its contextualisation – this indicated a lack of general knowledge and interpretation skills. Although the bar graph was clear, candidates still confused social indicators with the indicators dealt with in the business cycle. Common errors in Q4.3.2 included explaining what poverty is instead of the poverty line or describing it as a person. Candidates could not calculate the percentage of world population that lives above the poverty line of \$2 a day (Q4.3.3). Most candidates could not name the economic indicator used to compare standards of living.
- (c) It seems that current economic issues are not brought into the classroom on a more regular basis, hence some learners performed badly. Candidates' responses were too generic and lacked factual knowledge of the content.
- (d) The explanation of Black Economic Empowerment as a development initiative showed a lack of in-depth knowledge. Candidates were unable to describe topics in enough detail to earn marks and gave generic information with no relevance to BEE as a development initiative.
- (e) In Q4.6, many candidates listed the differences between the North–South divide instead of discussing the issues in full sentences.

#### Suggestions for improvement

- (a) Formative tests should be used to ensure that learners are able to understand and define what is meant by: poverty line, economic indicator and social indicator.
- (b) SAG state that up to 20% of an examination paper may contain content from previous grades that is pertinent to Grade 12 content. Revision of relevant Grade 11 work should be done before engaging with Grade 12 content. Extra learning material should be handed to learners during the academic year. Data provided in data response questions should be read like a newspaper (two to three times) before candidates attempt any questions. A general complaint is that candidates do not know whether the answer appears in the extract or whether they should give their own opinion.



If candidates studied the graph or extract (4.3 and 4.4) closely they would have found possible answers to some of the questions asked. If not found, they should provide their own opinions if not linked to subject content. Candidates could not interpret the bar graph correctly so failed to calculate the percentage of people living above the poverty line. Many candidates could not supply the correct concept which measures poverty in various countries.

After presenting a specific topic to learners, teachers must use past examination papers to provide learners with practice questions related to each topic. Learners will be able to accumulate resource material to assist them in preparing for the final exam and enable them to identify key words through regular use of typical exam questions. A clear distinction should be made between social and economic indicators. The *Examination Guideline 2014* informs teaching and learning as well as assessment at all times (see pages 28 and 29). Note the changes to economic and social indicators.

- (c) All economic content related to growth and development policies should be taught in detail. Learners need to improve their comprehension skills to improve how they answer text-based questions.
- (d) It is important for learners to practice essay questions in the classroom. Teachers must emphasize the discussion part of the paragraph as well as provide practical examples to illustrate points. Educators need to be politically knowledgeable so that learners can be assisted to understand the vital link between politics and economic issues such as the National Development Plan.

Teachers can make use of past examination papers for revision, but they should be creative in developing formative assessment tasks to expose learners to different ways in which a specific topic can be asked. Such approaches to questioning need to be in line with the *Examination Guideline 2014* and other policy documents. All essential basic definitions of basic economic concepts should be covered as this forms the basis to all knowledge in Economics. Practical examples should be used when teaching concepts. Assessment tasks should focus on the relationship of theory and practice i.e. discussion of the North–South divide, where learners could earn valuable marks for relevant examples. Enough teaching time should be allocated to *economic pursuits* so that learners can improve their performances in this main topic. Notice the changes in 2014, e.g. Special Economic Zones.

### QUESTION 5: Contemporary Economic Issues

The general performance of learners in this question ranged from poor to excellent. This was the question chosen by most candidates. The performance of candidates in Q5.2 was impressive.

#### Common errors and misconceptions

- (a) Many candidates answered Q5.3 on pollution and Q5.4 on COP 17 poorly. Poor performers tend to interpret the cartoon incorrectly. Candidates gave examples of pollution instead of the definition. Most candidates could not identify the two groups in the cartoon (Q5.4.2) and missed the message it conveyed. Failure to understand environmental sustainability as an economic concept in Q5.4 led to poor performance in this question. Candidates could not link the cartoon to international agreements on environment; instead, they referred to it as ‘cartels’ or ‘industrial action’.
- (b) When candidates were asked to explain the effect of tourism on employment and poverty they tended to provide only basic information on the effects. The majority of candidates provided the benefits of tourism instead of the effects. Paragraph responses showed a lack of in-depth knowledge. Candidates were able to list facts, but did not give the full descriptions which would earn full marks.
- (c) The responses in Q5.6 were very poor mainly because this topic covered only a small portion of the syllabus. Candidates discussed the public sector and not environmental sustainability. Learners’ responses to this question indicated that environmental sustainability had not been well taught so they tended to be generic and vague in their answers.

## Suggestions for improvement

- (a) With regard to answering paragraph-type questions, teachers should make use of specific questions from past papers and from the *Examination Guidelines 2014* to guide learners on how to identify the specific requirements of each question and how to structure an appropriate response. The use of contemporary issues in daily teaching might enhance learner knowledge and analytical skills, e.g. sharing newspaper cuttings on recent economic issues on a daily basis. Learners should be guided on the interpretation of cartoons: they need to identify the individuals or groups in the cartoon, establish their relationship and establish their actions in a particular context. It seems that candidates did not read the extracts adequately before attempting the question. Information provided about Gold Reef City in the extract was sufficient for learners to be able to respond to questions asked. Most responses required were directly located in the text; however, the majority of learners could not identify those responses, resulting in poor performance in this question.
- (b) Not all textbooks contain the same content. Teachers should use a variety of resource materials to prepare learners well for their final exam. During teaching time, current economic issues should be used as examples to illustrate the subject in realistic and current contexts.. Link Economics in the classroom to Economics in real life by exposing learners to actual data, graphs and statistics. Learners should be able to clearly differentiate between the benefits and effects of tourism and need to examine the effects and benefits in detail (see *Examination Guidelines 2014* page 32).
- (c) In this question (5) it is evident that learners have only a basic knowledge of certain economic terms and their inability to select or use correct economic terminology was displayed. This was evident where candidates could not determine which content to use to answer a question, e.g. market failure versus public sector failure (macro-versus microeconomics), externalities (macroeconomics, microeconomics or contemporary economic issues), the involvement of the public sector (as part of macroeconomics or contemporary economic issues). Educators should make use of the *Examination Guidelines 2014* to cover all main topics as indicated.
- (d) Learners should be better prepared to be able to select and answer questions in both Sections B and C. Too often it is only all questions in Section B that are done. Learners should understand and interpret the instructions on the question paper: More attention must be given to key verbs/instructional words that may appear in questions, practical examples should be used when dealing with various topics in Economics. Learners should be given more practical experience in the interpretation of cartoons, graphs and other statistical representations. Learners should be able to interpret the possible negative and positive implications of certain actions illustrated in a particular text.

## QUESTION 6: MACROECONOMICS AND MICROECONOMICS

The performance of learners in this question ranged between extremely poor and fair. Most candidates earned marks for the two lower-order questions (Q6.1 and Q6.2).

### Common errors and misconceptions

- (a) In Q6.3.3, many learners gave an injection that was not reflected on the diagram (e.g. exports).
- (b) Candidates did not understand the meaning of the word, 'rationale' in Q6.4.1. Most candidates performed poorly in this question based on the cost-benefit analysis. Candidates could not construct bar graphs but drew graphs based on interaction between demand and supply.
- (c) Candidates answered Q6.5 on labour resources and technology as reasons for international trade by using general knowledge. Candidates confused natural resources with labour resources. Candidates performed either excellently or poorly in this question.

- (d) In Q6.6, candidates were required to distinguish between price leadership and cartels as forms of collusion, but answered the question as if it were one concept and used general knowledge to answer it. Most candidates performed poorly. They did not attempt the question and those who did were too generic in their responses, which lacked economic content.

### **Suggestions for improvement**

- (a) Content on the circular flow is covered from EMS in the GET phase and continues up to grade 12 in the FET phase – yet learners lacked understanding of the interaction between the different participants in the economy and could not distinguish between an open and a closed economy. Candidates should be able to distinguish clearly between leakages and injections. Some candidates failed to identify a closed economy as the correct response. A lack of content knowledge of the circular flow prevented candidates from getting better marks.
- (b) Learners should be exposed to the correct terminology used in the NCS or *Examination Guidelines 2014* where the economic term ‘rationale’ is clearly explained. Candidates should have been exposed to the rationale, price mechanism, application and uses of Cost Benefit Analysis. Most candidates lacked content knowledge and understanding of CBA and how it is used by government to make decisions on the viability of projects. Most candidates were able to draw a labelled bar graph but they failed to earn full marks as the answer was only partially completed.
- (c) Comprehensive content coverage is of the utmost importance. It seems as if certain parts of the syllabus were left out or regarded as unimportant as teachers prepared their learners for the final exam paper. Candidates performed poorly because they discussed technology and labour in general instead of relating them within the context of international trade.
- (d) Learners’ responses in this question indicated a serious lack of economic content knowledge on price leadership and cartels as forms of collusion. Thorough revision of all the main topics is recommended. The *Examination Guidelines 2014* and other policy documents should be used when planning lessons. This will ensure that all topics are taught according to the relevant cognitive levels.

### **QUESTION 7: Macroeconomics**

The general performance of learners in this question ranged from poor to excellent.

#### **Common errors and misconceptions**

- (a) Candidates were not familiar with the lay-out of the paper i.e. the second part of the question (10 marks) – they only answered the main part for 30 marks. This could be the reason for candidates’ inclusion of the objectives of the fiscal policy.
- (b) Low ability candidates mixed up concepts such as income tax and tax income. Candidates did not perform well in the drawing and labelling of the Laffer curve.
- (c) Many candidates did not structure the question properly: they confused the composition; effects, etc. and supplied everything on the topic. Some candidates confused fiscal policy with monetary policy and discussed interest rates in their responses.
- (d) Many candidates did not use the correct structure for writing essays, i.e. introduction, body and conclusion.
- (e) Some candidates who performed poorly in the rest of the paper, managed to do well in this question.

## Suggestions for improvement

- (a) The learners should be introduced to higher-order questions from Grade 10, as required by policy and guidelines. Learners should be taught to read the instructions carefully before they attempt to answer the question. Candidates did not respond to the EFFECTS only but wrote on the composition and characteristics as well. Fiscal and monetary policies are discussed in various ways under different topics. Candidates should be able to determine which part of the topic should be included in their answer. Learners should be taught to state their viewpoint and support it logically.
- (b) Teachers and learners should use *Mind the Gap* to cover 'gaps' left by some textbooks on subject matter.
- (c) Tests and half-year exams should be set in the same way as the NSC examination question papers to prepare learners better for the final exam.
- (d) Learners should be taught to read all aspects of the question before attempting it to avoid losing marks unnecessarily.
- (e) Correct interpretation of questions is critical, so content should be continually assessed in line with the *Examination Guidelines 2014*.
- (f) Candidates' answers should always be properly structured. Most essays consisted of two parts: a main and an additional section. Many candidates did not clearly indicate their introduction and conclusion. Learners should be taught how to answer questions that require an evaluation of policies or present their own opinion in essay type questions.

## QUESTION 8: Microeconomics

The general performance of candidates in this question ranged from very poor to excellent.

### Common errors and misconceptions

- (a) Many candidates experienced problems regarding graphs. These included:
  - incorrect drawing and labelling of curves;
  - inability to distinguish between graphs for the perfect market and graphs for the imperfect market (monopoly);
  - inability to distinguish between economic loss and economic profit; and
  - not reading the question and including most graphs discussed in Microeconomics.
- (b) The question was answered poorly because candidates could not construct and label graphs properly. There was confusion in labelling MR, MC, AR and AC curves. Equilibrium points and indication of economic profit, loss and normal profit were not properly indicated in the graphs.

Candidates did not analyse the graphs. Instead, they discussed the formation of the horizontal demand curve. They misinterpreted the individual firm to refer to one seller in the monopoly as a market structure. Candidates did not know the difference between conditions and characteristics: instead of examining the conditions, they listed them. Candidates could not draw a clear distinction between economic profit, economic loss and normal profit. Poor performance in this question implies that the topic may have been neglected in many classrooms.. Vague answers often accompanied the graphs. Many candidates repeated facts already mentioned in the introduction, body and conclusion. Candidates listed conditions of a perfect competitor without examining its effectiveness in the market.

### Suggestions for improvement

- (a) Continual practice in the drawing of graphs is essential. Learners should be given more homework on graphs to enable them to differentiate clearly. More than 60% of the graphs were technically incorrect. Learners should practice different graphs and supply detailed information as part of each graph. Teachers can use the explanations of graphs in *Mind the Gap* to enhance lessons. There is a clear indication that graphs are taught, but the most important features are still not emphasised. Learners know the behaviour of firms in the short run. Points mentioned for the drawing of graphs should be noted. In teaching the content, emphasis should be placed on the shape and labelling of curves, the equilibrium point and position of the AC curve.
- (b) The majority of learners used short phrases instead of full sentences to compare information as the question required. This was noted especially where they presented facts in tabular form.

### QUESTION 9: Economic Pursuits

The general performance of learners in this question ranged from poor to fairly good.

#### Common errors and misconceptions

- (a) Learners who performed poorly confused environmental sustainability and Industrial development, import and export promotion. Common errors in the main part included discussing IDZ as SDI, the use of short phrases without meaning or writing an essay on another topic instead of responding to the question. Many candidates discussed economic and growth policies e.g. RDP, GEAR, instead of focusing on *Spatial Development Initiatives and Industrial Development Zones*.
- (b) Common errors in the additional part included the listing of incentives without explanations, providing the correct incentive followed by a wrong explanation, and not explaining how appropriate the incentives were.
- (c) Learners rote, learned certain questions and included answers that were not relevant at all.
- (d) Many learners repeated facts already mentioned in the introduction, body and/or conclusion of the essay.

### Suggestions for improvement

- (a) Learners should be shown how to interpret the requirements of each question. This will ensure that they do not omit any crucial aspect of the answer. Emphasis should be placed on clarifying areas that can cause confusion to learners. Economic pursuits need to be given adequate teaching time so that learners do not end up confusing '*regional development policies*' with '*economic and growth policies*'. Learners need to be taken on excursions on IDZs to stimulate their interest in the subject matter and economic pursuits in particular.
- (b) Basic content should not only be covered for compliance but must be linked to the practical implementation of each topic to tap the creativity of learners to enable them to apply their Economics content knowledge in a variety of contexts.. Case studies and class discussions can be used gainfully in this regard. Candidates need to improve their evaluation skills. Continually updated knowledge about recent developments can assist in making the module more interesting for both teachers and learners.

## QUESTION 10: Contemporary Economic Issues

Some learners who attempted this question performed very well and provided more information than was needed for full marks. Those who did not perform well got confused by the causes and consequences of inflation, inflation in South Africa and characteristics and types of inflation.

### Common errors and misconceptions

- (a) Many learners included irrelevant data on inflation, or wrote on tourism which they had rehearsed an essay in preparation for the examination. Some candidates were not able to examine the different measures to combat inflation. Candidates failed to demarcate their responses by using relevant headings. Many candidates confused monetary policy measures and fiscal policy measures.
- (c) Low ability learners could not analyse the consequences of inflation for income and wealth. In some cases, generic information that had no bearing on the economic content was given but it was merely a reflection of their personal perspective.

### Suggestions for improvement

- (a) Formative tests should be used to ensure that learners are able to understand and define what is meant by fiscal and monetary measures to combat inflation.
- (b) The whole syllabus should be finished in time so that there is adequate time for revision of topics that may have been problematic for learners.
- (c) Learners should keep abreast of current news issues that are pertinent to aspects of Economics and be given the opportunity to discuss these issues in class.
- (d) Basic content should not only be covered for compliance but should be linked to practical implementation of each topic so that the creativity of all learners is tapped and they are thoroughly prepared to demonstrate an application of their knowledge and skills. The use of case studies and structured classroom discussions can be used gainfully in this regard. The *consequences of inflation on income and wealth*, is a good example of such an evaluation being explored more creatively.

## ENGLISH FIRST ADDITIONAL LANGUAGE

### 6.1 PERFORMANCE TRENDS (2010 – 2013)

In 2013, compared to 2012, there was an increase in the percentage of candidates who achieved at 30% and above and at 40% and above. The improvement in an estimated 34 000 candidates achieving higher quality passes augurs well for post-school written and spoken language competencies of the First Additional Language learners in particular.

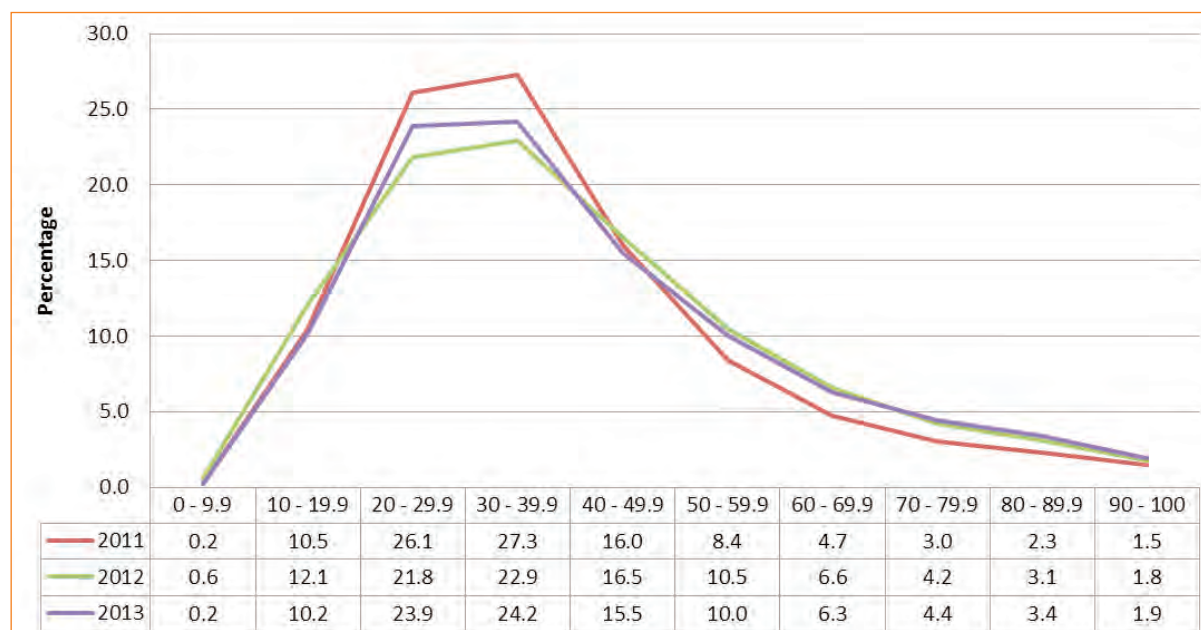
**Table 6.1.1: Overall achievement rates in English First Additional Language**

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
2010	449 080	424 392	94.5	320 350	71.3
2011	414 480	398 740	96.2	315 313	76.1
2012	420 039	410 999	97.9	348 261	82.9
2013	454 666	449 420	98.8	403 081	88.7

**Figure 6.1.1: Overall achievement rates in English First Additional Language**



**Figure 6.1.2: Performance distribution curves English First Additional Language (2011–2013)**



In 2012, there was a decrease in the percentage of candidates who performed at 0 – 39% compared to 2011 and an increase in the percentage of candidates who performed at 40% to 100%.

In 2013, there was another decrease in the percentage of candidates who performed at 0 – 39% compared to 2012 but an increase in the percentage of candidates who performed at 40% to 100%.



## 6.2 OVERVIEW OF LEARNER PERFORMANCE IN PAPER I

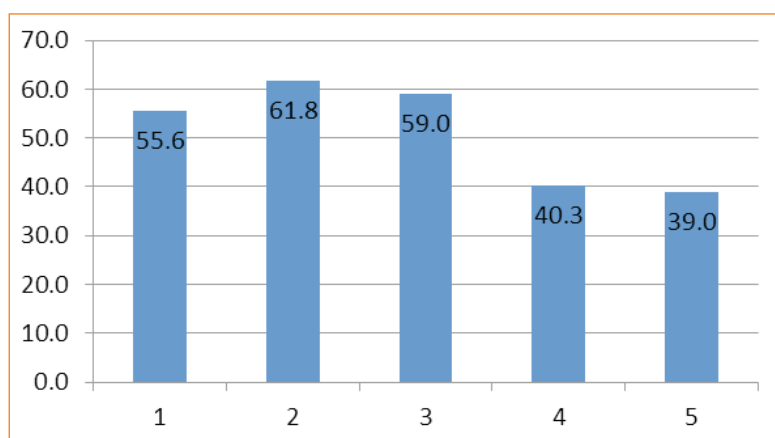
### General comments

- (a) The evidence suggests an improvement in comprehension skills and more learners are performing better in Section A.
- (b) Many learners still lack the necessary vocabulary required to enable them to have a better understanding of figurative and idiomatic language.
- (c) The summary question was generally well-answered.
- (d) The Language Section yielded the weakest performance compared to the other two sections. Performance in Question 3 (Analysing an Advertisement) was satisfactory. There was a slight drop in the marks for Question 4 (Analysing a Cartoon), and still poorer performance in Question 5 (Language and Editing).

## 6.3 DIAGNOSTIC QUESTION ANALYSIS FOR PAPER I

The following graph reflects the performance of a sample of 100 candidates in Paper 1. Candidates were least successful in answering Question 5, which tested language and editing skills.

Figure 6.3.1: Average marks per question expressed as a percentage in Paper 1



Q1	Comprehension
Q2	Summary
Q3	Analysing an advertisement
Q4	Analysing a cartoon
Q5	Language and editing skills

## 6.4 ANALYSIS OF LEARNER PERFORMANCE IN INDIVIDUAL QUESTIONS IN PAPER I

### QUESTION ONE: Comprehension

#### Common errors and misconceptions

Whilst there was an improvement in performance, it is worth noting that for some candidates, answering a comprehension question seemed to be an unfamiliar experience. A few learners could not follow instructions not could they express themselves well enough in the questions they did attempt to answer. They thus lost marks unnecessarily.

### Common errors, misconceptions and other weaknesses found in candidates' answers:

- (a) A severe lack of necessary vocabulary contributed to the inability of candidates to express their thoughts clearly. For example, candidates were not able to interpret and convey in their own words how pictorial stimuli conveyed a message in question 1.15.
- (b) Low ability candidates were not able to decode figurative meaning.
- (c) Inability to recognise and follow key words in a question e.g. *Explain/Quote a single word/in which TWO ways...*
- (d) Inability to structure a response in relation to mark allocation of a question, e.g. 2 marks would require TWO facts. For instance, some candidates mentioned only a single fact for question 1.1 despite the question's having a two-mark allocation.
- (e) Inability to produce a well-substantiated answer for higher-order questions. A single reason provided without qualification meant that candidates achieved one mark only.
- (f) Inability to identify the focal point of the question, resulted in candidates using long quotations because they had located a word in the paragraph that was also in the question and built their response around it.
- (g) Inability to respond appropriately to a question that requires a two-fold answer or substantiation.
- (h) Candidates often did not answer the question. They instead duplicated part of the question and tried to write about it in an expansive manner which resulted in the response being irrelevant to the question.
- (i) Failure to number responses correctly according to the numbering used in the question paper.

### Suggestions for improvement

- (a) Although learners seemed more able to express opinions, they should be taught figurative and idiomatic language so that the nuances of the passage are not lost.
- (b) Vocabulary can be improved by exposing learners to suitable texts.
- (c) Learners need to be exposed more to visual texts so that they can become skilled at identifying details and expressing themselves correctly.
- (d) Teachers need to allow candidates enough opportunity to practice and strengthen comprehension skills in the classroom. This includes being able to read a question properly and know how to respond in relation to its mark allocation.
- (e) Learners must be taught to scrutinise questions for key words like 'quote' and 'explain' and how they should respond to such; i.e. they must become familiar with assessment vocabulary and how to respond to it.
- (f) Candidates should be made aware that only some questions require their own views or opinions and that answers must be text-based unless the contrary is explicitly stated in the question.
- (g) Learners must be taught that if a certain number of responses are asked for, (e.g. 1.7.2; 1.9; 1.10), then only that number of responses will be marked. For example, in question 1.7.2, some candidates lost marks as the correct answers provided exceeded what was required from them.

## QUESTION TWO: Summary

### General comments

- (a) Most candidates seem to have mastered how to respond to this question.
- (b) Most of the candidates were able to identify and reproduce the relevant facts from the passage and obtain good marks for doing so.
- (c) Most candidates indicated the number of words used and most used a neat point-form format.
- (d) Only a handful of candidates exceeded the maximum number of words.
- (e) Lack of Language proficiency remains a barrier – some candidates quoted incoherent ‘chunks/ extracts’ from the passage and seemed oblivious of the fact that it did not make sense.

### Common errors and misconceptions

- (a) Some candidates were not able to identify topic sentences in a paragraph, e.g. fact no 5.
- (b) A few candidates did not use the facts provided in the passage but wrote seven ‘creative’ points of their own and thus lost marks.

### Suggestions for improvement

- (a) Learners should be given numerous opportunities to summarise texts, starting in earlier grades, as required by the curriculum.
- (b) Teachers ought to expose learners to as many different texts as possible and draw their attention to the importance coherence in the points they select.
- (c) Learners should know how to transcribe accurately – a skill which will also help them in the language section of the paper.

## QUESTION THREE: Analysing an Advertisement

### Common errors and misconceptions

- (a) Some candidates appeared to be unaware of basic advertising terms like ‘slogan’ and ‘brand’.
- (b) In responding to question 3.6, some candidates merely gave a description of the pictures, and neglected to make the link between the message of the advertisement and the pictures as required by the question.
- (c) If asked for ONE reason (question 3.4), candidates must give no more than ONE reason. Candidates who gave a list, in which a wrong answer appeared first, lost the mark.
- (d) Many candidates could not interpret figurative or idiomatic language.

### Suggestions for improvement

- (a) Teachers and candidates must note that the language section of the question paper starts with Question 3 – this is not an extension of the comprehension section.

- (b) Candidates must be taught the language of advertising, e.g. the difference between a slogan, a catch-phrase and a brand name.
- (c) Candidates must be taught to transcribe correctly and use the correct language structures if required to do so.
- (d) It would be beneficial if teachers could use the advertising on television and radio, in magazines, newspapers and on billboards as resources in their teaching, to make this question accessible to all candidates. Because this is a short text with a combination of text and visual material, it should be an opportunity even for the low ability candidate to gain marks.

#### QUESTION FOUR: Analysing a Cartoon

##### Common errors and misconceptions

- (a) Some candidates still don't know the basic terms of this genre such as 'cartoonist' and 'frame'. Some candidates seemed to think that 'characters' are 'cartoonists'.
- (b) Some learners lost marks because of their poor grasp of figurative language.
- (c) Being able to identify tone of voice was a problem for candidates in 2012, and was the basis of a multiple-choice question in 2013, and yet, it was still answered poorly.
- (d) In question 4.1.1, many candidates referred to 'body language' and 'facial expression' without elaborating on the aspect of body language or facial expression in question – thus forfeiting the mark.
- (e) In question 4.2, candidates were required to refer to both characters. However, many answers made reference to only one character, thus costing the candidates the second mark.

##### Suggestions for improvement

- (a) The basic features of visual literacy must be taught. Candidates did not have a confident grasp of terms such as 'frame' and 'cartoonist' and could not express themselves comfortably when dealing with body language. For this reason, questions which are intended to be easier were actually more difficult for these candidates.
- (b) Candidates must be taught to utilise the information provided in the question paper. Many candidates mistook Jeremy's mother for a boy, or referred to Jeremy as 'the husband', something which would not have happened had they read the note below the cartoon.
- (c) Learners should be given more opportunities to read, enjoy and interpret cartoons so that they become familiar with this type of question. By doing this, they will also learn useful language structures.

#### QUESTION FIVE: Language and Editing

This section tests language accuracy, so spelling, punctuation and transcribing accurately are important.

##### Common errors and misconceptions

- (a) Candidates were inaccurate when it comes to the mere transcription of text.
- (b) Candidates did not know the basic language structures. For example:
  - A number of candidates could not identify 'connected' as the past tense of 'connects' in question 5.1.1. Some candidates who knew the verb form, made other transcription mistakes, thus forfeiting the mark;

- In question 5.1.2 (b), most candidates did not recognize the incorrect use of the apostrophe;
- Many candidates simply guessed that 'similarity' was wrong, but failed to give the correct form;
- Some candidates did not know the meaning of the idiomatic expression, 'Survival of the fittest' in question 5.1.3;
- Most candidates performed poorly in questions 5.1.4, 5.1.5, 5.1.7 and 5.2.5, probably owing to the subject terminology used;
- Most candidates performed poorly when dealing with the construction, 'Not only ... but also' in question 5.1.6;
- Poor performance in question 5.1.8 also revealed a poor knowledge of parts of speech;
- Despite the instruction, in question 5.2.1, to turn the sentence into a tag question, many candidates wrote down only a tag or turned it into another kind of question; and
- Most candidates could not give the correct past participle of the verb 'to keep' in question 5.2.5.

### **Suggestions for improvement**

- Teachers should encourage error-free responses in classwork activities and tests. In Section C, any language mistake which occurs, even outside the structure which is being tested, will be penalised.
- Spoken language should receive attention in order to improve learners' 'working knowledge' of English.
- Regular use of English as the predominant means of communication during lessons can help improve the candidates' vocabulary and general language ability.
- Question 5 tested very basic skills which must be taught, practiced and studied. Better preparation of learners should improve their confidence and motivation levels and yield improved performance in this question paper.

## **ENGLISH FIRST ADDITIONAL LANGUAGE P2**

### **6.5 OVERVIEW OF LEARNER PERFORMANCE ON PAPER 2**

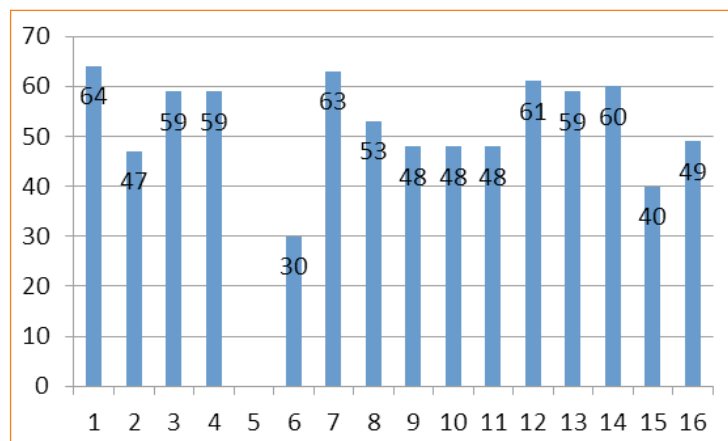
#### **General comments**

- Provincial reports suggest that candidates are becoming more familiar with the different types of questions. Fewer candidates than in the past attempted to answer all the questions instead of choosing two genres.
- Candidates still preferred the contextual questions to the essay questions. The essay question will no longer be included in this paper in future, but it should be mentioned that the skill of writing a literary essay seems to have improved.
- It seems as if candidates are becoming more adept at answering the open-ended questions. They must just keep in mind that when these questions are text-based (e.g. 2.1.8(b); 4.2.9; 10.2.9) they should be answered with the text in mind.
- Candidates who studied the prescribed texts, interpreted their questions carefully and responded in accordance with the mark allocation, performed well.

## 6.6 DIAGNOSTIC QUESTION ANALYSIS OF PAPER 2

The following graph reflects the performance of a sample of 100 candidates in Paper 2. Candidates performed the least in question 6 (*A Grain of Wheat*). This novel was also the least popular choice, and no candidate in this sample attempted the essay question on it.

**Figure 6.6.1: Average marks per question expressed as a percentage in Paper 2**



Q1	<i>To Kill a Mockingbird</i> (Essay)
Q2	<i>To Kill a Mockingbird</i> (Contextual)
Q3	<i>Lord of the Flies</i> (Essay)
Q4	<i>Lord of the Flies</i> (Contextual)
Q5	<i>A Grain of Wheat</i> (Essay)
Q6	<i>A Grain of Wheat</i> (Contextual)
Q7	<i>Romeo and Juliet</i> (Essay)
Q8	<i>Romeo and Juliet</i> (Contextual)
Q9	<i>Nothing but the Truth</i> (Essay)
Q10	<i>Nothing but the Truth</i> (Contextual)
Q11	<i>The Secret Life of Walter Mitty</i> (Essay)
Q12	<i>The Sisters</i> (Contextual)
Q13	Sonnet 116 (Contextual)
Q14	<i>Mementos, 1</i> (Contextual)
Q15	<i>The Birth of Shaka</i> (Contextual)
Q16	<i>An Elementary School Classroom in a Slum</i> (Contextual)

## 6.7 ANALYSIS OF LEARNER PERFORMANCE IN PAPER 2

### Common errors and misconceptions

- Many candidates could not respond to questions requiring interpretation and use of figurative language in poetry.
- When asked to identify a figure of speech, many candidates demonstrated a total lack of knowledge by giving answers such as 'direct speech' or 'passive voice'. This question was mostly followed by a second question requiring the candidate to explain why this figure of speech was effective, which the candidate could then not do either.
- Candidates have not fully grasped the meaning of some commonly-used assessment terms such as 'discuss' and 'explain'. This is a serious shortcoming, as the questions containing these words often count multiple marks which are lost when candidates give one-word answers to questions requiring explanations or discussions.
- Some candidates approached the paper as they would a comprehension test by merely seeking all their answers in the extracts.
- Candidates often failed to use references given to them in the paper (e.g. questions 4.1.3, 8.1.3, 10.1.2 and 13.8) and then gave irrelevant answers.

- (f) When asked to make two or more points, candidates often started a numbering system of their own which confused them.
- (g) The questions on stage directions (8.2.4; 10.2.4) were not well-answered.
- (h) In the short stories, one of the most popular genres, some candidates appeared not to have studied the short stories at all. In both the essay and the contextual questions, characters and events from other stories sometimes cropped up. Some candidates used only the words from the extracts to answer the questions, indicating that they did not know anything beyond what was given in the question paper.

### **Suggestions for improvement**

- (a) Learners must be taught to read, use and decode figurative language and other literary devices in literature, more especially in poetry. Teachers must teach and test all the figures of speech and literary devices regularly. Candidates should be familiar with these devices so that they are not only able to identify them, but also appreciate, explain and discuss their use. A detailed study of all the relevant techniques is needed.
- (b) Learners must be taught the language of assessment as well as how to respond to such terminology.
- (c) All the texts must be read closely and thoroughly. Learners must be taught that an extract is only a lead-in, and not the text in which all the answers will be found. They must be taught that questions are set beyond the extract, and thus need thorough knowledge and understanding of the text. Studying and understanding the entire text is important.
- (d) The genre of short stories is not the easy way out. Because the short story is shorter and less complex than a novel or a drama, more detailed knowledge is expected. Closer reading, led by the teacher, is required. The teacher must provide guidance with regard to structure, language, literary devices, characterisation and other techniques.
- (e) In the study of drama, body language, facial expression and tone of voice are important and should be taught. The importance of stage directions, setting, costumes, casting, tone of voice and other aspects of drama must also be taught.
- (f) Teachers must afford the candidates an opportunity to watch the drama either as a stage production or on a DVD, where possible. However, this must not replace the study of the written text.
- (g) Candidates need to be exposed to typical examination instructions and forms of question so that they are confident when they are confronted with the question paper. Multiple-choice questions, fill-in questions and words like 'identify' or 'discuss' should not be encountered for the first time when the final examination is written.
- (h) Novels must be studied in depth. Insight is required at Grade 12 level, but insight can be expected only after knowledge has been acquired. Candidates must understand that a novel is more than a mere plot – they must have an understanding of characterisation, structure and themes.
- (i) Teachers must use all available resources, but it must be kept in mind that nothing can ever replace the studying of the prescribed text: no study guide or DVD can take the place of teaching and studying the actual text.

## 6.8 OVERVIEW OF LEARNER PERFORMANCE IN PAPER 3

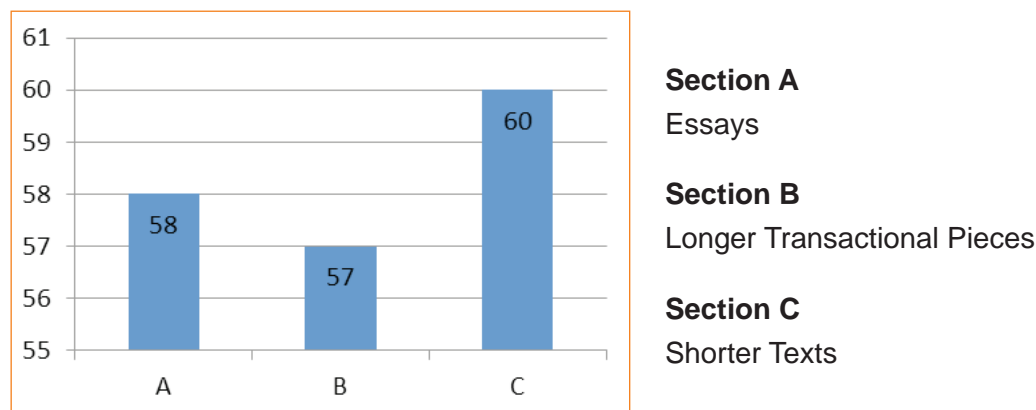
### General comments

- (a) Practical issues like neat handwriting, a pen of good quality, starting each new section on a new page, clearly crossing out all rough work and giving each piece of writing a clear and correct number and title, sound trivial. These are, however, very often the ingredients of a winning recipe.
- (b) Candidates must be familiar with the marking rubric for this paper. If they know how they are being assessed, they will take more care to avoid pitfalls and they will focus on those areas where they can gain credit.
- (c) The performance in Paper 3 is influenced by work done in preparation for both Paper 1 and Paper 2 – the language structures used in formal language exercises can be used very effectively: for example, sometimes the passive voice is more effective than the active voice. The importance of sentence construction and paragraphing cannot be stressed enough. Figures of speech and other nuances of the language which are picked up in the study of literature can be used most productively in Paper 3.

## 6.9 DIAGNOSTIC QUESTION ANALYSIS FOR PAPER 3

The following graph reflects the performance of a sample of 100 candidates in Paper 3. Candidates performed least successfully in Section B.

### 6.9.1: AVERAGE MARKS PER SECTION EXPRESSED AS A PERCENTAGE IN PAPER 3



## 6.10 ANALYSIS OF LEARNER PERFORMANCE IN INDIVIDUAL QUESTIONS IN PAPER 3

Common errors and misconceptions

### SECTION A: Essays

- (a) In responding to Question 1.2, many candidates failed to provide a contrast between *those* days and the present. Most candidates chose the narrative angle, thus missing out on the reflective nature of the question. A handful of candidates, however, managed to write a good reflective essay.
- (b) Question 1.3 was chosen by many candidates and many wrote successfully. Unfortunately, some candidates took 'amazing' as used in the topic as a negative word and wrote about crime, corruption, poverty and other aspects of the country which cannot really be interpreted as 'amazing'.



- (c) Question 1.4 provided problems as candidates had trouble deciding what exactly 'moments', as used in the topic, entailed. Some went back years in their narrative while the topic aimed at a more immediate time frame.
- (d) Question 1.5 elicited good responses and showed that candidates are positive about their future, regardless of their present circumstances. Many responses were the candidates' real-life stories, instead of fictitious ones. Very few candidates used their imagination to write good fictional essays.
- (e) Many responses to Question 1.6 indicated that candidates think all role models are celebrities or at least well-known people. Few candidates used family members, teachers or friends as examples, while these must certainly be the more common role models.
- (f) In all topics, sentence construction and paragraphing proved to be problematic – candidates became lost in their own very long sentences and many seemed to have no idea of paragraphing.

### **Suggestions for improvement**

#### **SECTION A**

- (a) Candidates should be taught to analyse all topics carefully to ensure they understand what they are expected to do. If a topic refers to 'moments' or 'those days', candidates must understand what is meant – if not, they should choose another topic which they are certain contains no nuances such as might trip them up.
- (b) Teachers must give candidates guidance on how to choose their topics. This will be possible only if candidates are given enough opportunities to write a variety of pieces and in the process discover their strengths and weaknesses.
- (c) The importance of planning, proofreading and editing must be stressed and taught. Using these skills, candidates would produce logically structured, coherent pieces.
- (d) The impact of a suitable introduction and strong conclusion must be taught.
- (e) Candidates should be exposed to good writing – much more than their prescribed literature. Even the work of other learners, but also works of journalists or authors, can be set as achievable goals for learners to aim towards.
- (f) Teachers should come up with innovative ways to improve the vocabulary of their learners, as well as other skills needed for this paper, like spelling, concord and sentence construction.

#### **SECTION B: Longer Transactional Pieces**

- (a) Most candidates who chose Question 2.1 performed well. The format was handled quite well, although some candidates still omitted small details like the name of the company. Many candidates omitted the topic line while some of those who did, did not write a suitable one. The word 'gratitude', it would appear, was not clear to some candidates. A number of candidates faltered when it came to the suitable, formal ending of the letter.
- (b) The interview was the second most popular choice and candidates did quite well. Most candidates could show off their knowledge of the kind of questions expected at a job interview. A small number of candidates still used quotation marks in the dialogue format.
- (c) The formal report was not chosen by many candidates.

- (d) The magazine article was dealt with successfully by those candidates who knew the format of the text. The candidates who did not know the format treated this topic as a mini-essay.

### **Suggestions for improvement**

- (a) All the different transactional pieces must be taught by the end of Grade 12.
- (b) Learners must be taught the format, tone and style used in the different genres.
- (c) The importance of planning, proofreading and editing must be stressed. Using these skills, candidates would produce logically structured, coherent pieces.
- (d) Candidates must have ample opportunity to write transactional pieces – this is a skill they will use after leaving school, and they will be able to acquire and refine it if they are given enough opportunities to do so.

### **SECTION C: Shorter Texts**

- (a) Many candidates scored well in the advertisement, using their knowledge of advertising techniques. Some candidates came up with very innovative brand names and slogans. Some advertisements contained too few words, however.
- (b) The diary entries were handled well by most candidates who chose them – the immediacy and personal character of a diary seem to have been grasped by candidates.
- (c) Question 3.3 elicited some good responses but unfortunately some candidates seem to have treated this carelessly, with little attention to correct language and punctuation. This seemed to be a trend across all options in Section C.

### **Suggestions for improvement**

- (a) Candidates must be encouraged not to treat this section as less important: even though the short text counts only 20 marks, it is important as candidates can score high marks here.
- (b) Good planning is very important in this section and candidates should be encouraged not to neglect this aspect. Responses which are not in a logical sequence cost valuable marks, and planning could have prevented that loss.

## CHAPTER 7

### GEOGRAPHY

The following report should be read in conjunction with the Geography question papers of the November 2013 Examination.

#### 7.1 PERFORMANCE TRENDS (2010 – 2013)

The overall achievement in Geography has improved. The percentage of learners who achieved at 30% and above shows a steady increase from 2010. Most satisfactory also is the increase in the number of candidates who achieved at 40% and above. There is a gradual increase from 2010 to 2012, and a significant increase from 2012 to 2013. It is gratifying to see that the number of learners sitting for the Geography examination is still increasing (239 657 in 2013), after a significant drop in the number of candidates that wrote in 2011.

Table 7.1.1: Overall achievement rates in Geography from 2010 – 2013

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
2010	209 854	145 187	69.2	85 241	40.6
2011	199 248	139 405	70.0	84 169	42.2
2012	213 735	162 046	75.8	99 760	46.7
2013	239 657	191 834	80.0	127 873	53.4

Figure 7.1.1: Overall achievement in Geography from 2010 – 2013

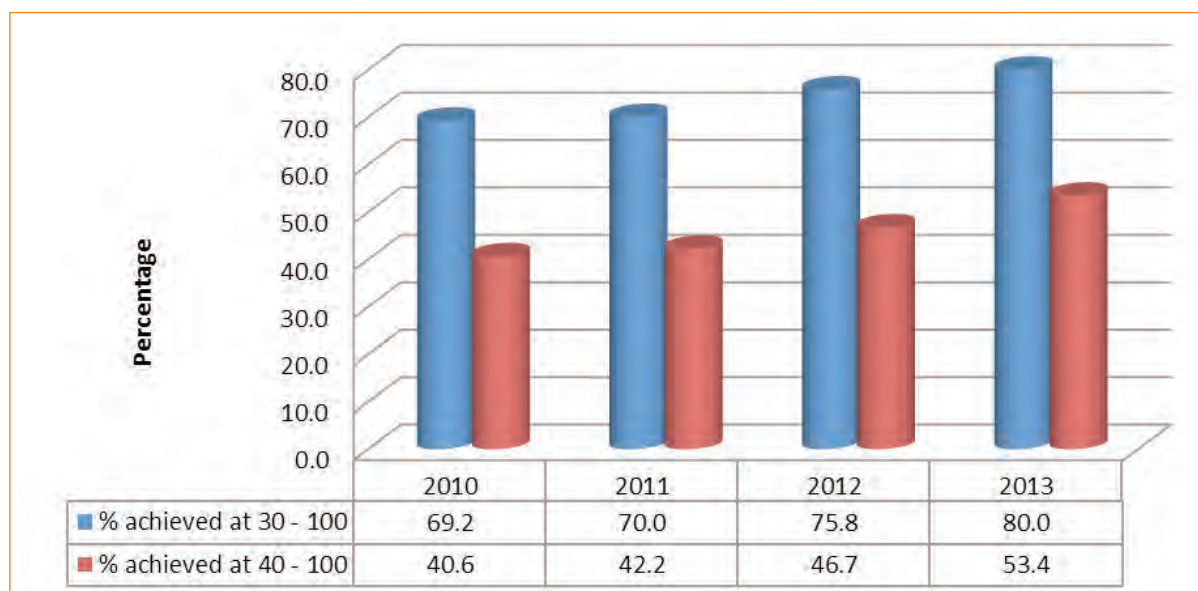
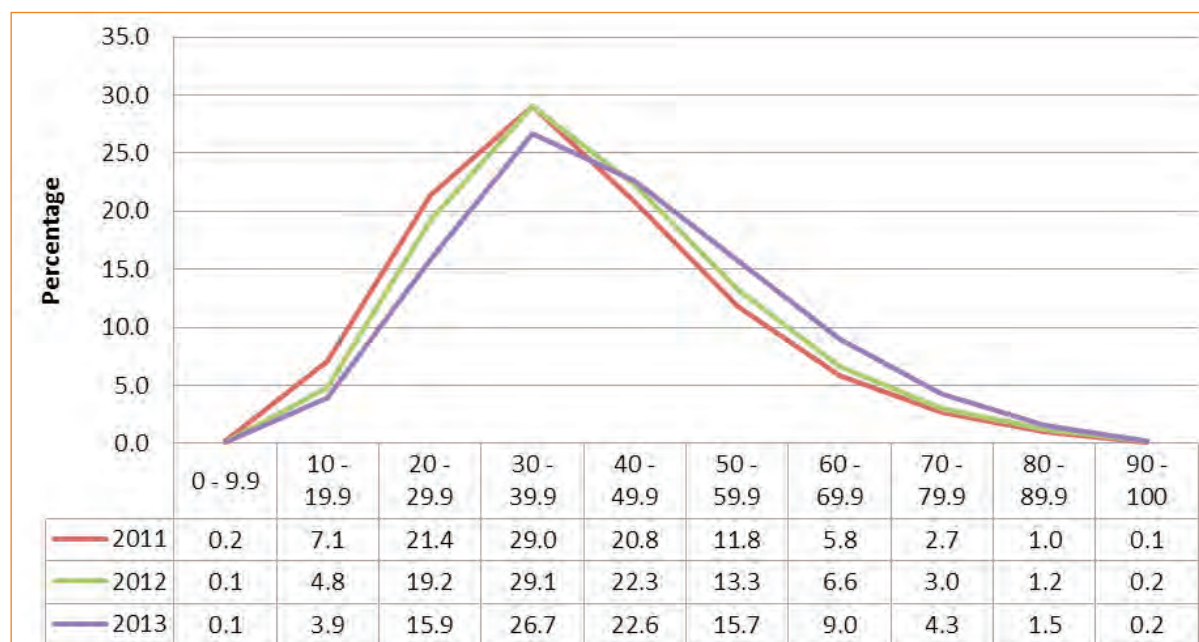


Figure 7.1.2: Performance distribution curves (2010 – 2013)



## 7.2 OVERVIEW OF LEARNER PERFORMANCE IN PAPER I IN 2013

### General comments

- The question paper was well received by educators and candidates. There was general agreement that the paper was of a fair standard, candidates had enough time to finish the question paper, all cognitive levels were covered, and all learning outcomes and assessment standards were tested. The use of language in the question paper was generally good. Words/phrases that made it difficult for second- and third-language speakers to interpret the questions correctly were minimal.
- Many candidates still showed a lack of content knowledge and did not know the basic definitions of concepts. Candidates who did not understand the basic concepts struggled. Often, questions that followed on from a question on the basic concept could not be answered.
- Reports from various provincial departments indicated that candidates performed better overall than in the previous year.

### General suggestions for improvement

- Teachers must make sure that learners know the importance of definitions and have a clear understanding of the basic concepts taught in Geography.
- Repetitive formative tests should be written to develop mastery of subject terminology.
- Teachers should encourage learners to make a glossary of geographical terms.
- Teachers must teach the basic concepts, but ensure that they have the knowledge to teach effectively. An in-depth knowledge of concepts is required. If, for example, a geographical problem is stated, learners should also study the causes and effects of the geographical problem, as well as possible solutions to it.

- (e) Teachers must collect sources on an ongoing basis and be aware of what is happening worldwide. In particular, they should be familiar with natural disasters that will be studied in CAPS 2014. Teachers are advised to research the topics that are commonly examined and ensure that content is taught correctly.
- (f) Teachers should use cartoons as source material and teach learners how to interpret the implied meanings of cartoons. The purpose of using cartoons is to evoke an emotion in the person studying the cartoon. Teachers and learners alike must be alerted to the fact that these emotions will vary from person to person, and this should be taken into account when marking questions based on cartoons.
- (g) Teachers must use source-based questions in class assignments, tests and examinations. They must make use of relevant and recent resources from the internet and avoid using sources that appear in textbooks and that are familiar to learners.
- (h) Teachers should demonstrate to learners how to identify the issue to be answered. For example, a question often has a statement followed by the question. The statement often relates to the question, but can differ from the question. Learners sometimes have the tendency to read the statement only and take it as the question.
  - Example: *The fluvial landforms in the upper and lower course of a river differ greatly. Write a paragraph (approximately 12 lines) in which you explain how the different stream-flow and erosion processes are responsible for the development of different landforms in the upper and lower courses.*
  - Learners should not merely state the differences between fluvial landforms in the upper and lower courses of the river. The opening line already states that differences exist. The question requires candidates to explain the different stream-flow *processes* responsible for the development of different landforms in the upper and lower courses.
- (i) Expose learners to as many different types of sources as possible; for example, graphs, tables, sketches, photographs articles, cartoons, etc.
- (j) Teachers should be aware of relevant subject content by constantly referring to the CAPS document and Examination Guideline. Prescribed textbooks do not always contain all of the subject content.
- (k) Teachers should provide learners with a copy of the examination guidelines to be used as a checklist when studying for tests/examinations.

### General comments for Paper 1

- (a) To improve learner performance, teachers must use previous examination papers to ensure that the standard of questions used in the assessment at school is appropriate. This will also assist teachers to get candidates accustomed to the style of question setting.
- (b) Teachers must ensure that the distribution of marks in the internal assessment tasks is according to the CAPS document. It is 25% lower order, 50% middle order, 25% higher order. If too many lower-order questions are asked in the internal assessment conducted at school, learners will not be exposed to the higher-order questions that are asked in the final examination and will therefore have a false notion of the level of performance required of them.
- (c) Teachers must locate a variety of fresh and interesting sources on which to base their questions. If resources are used from the textbook in use in a particular school, learners are not exposed to new sources as they would be in an external examination. Exposing learners to new sources helps to train them to analyse resources.

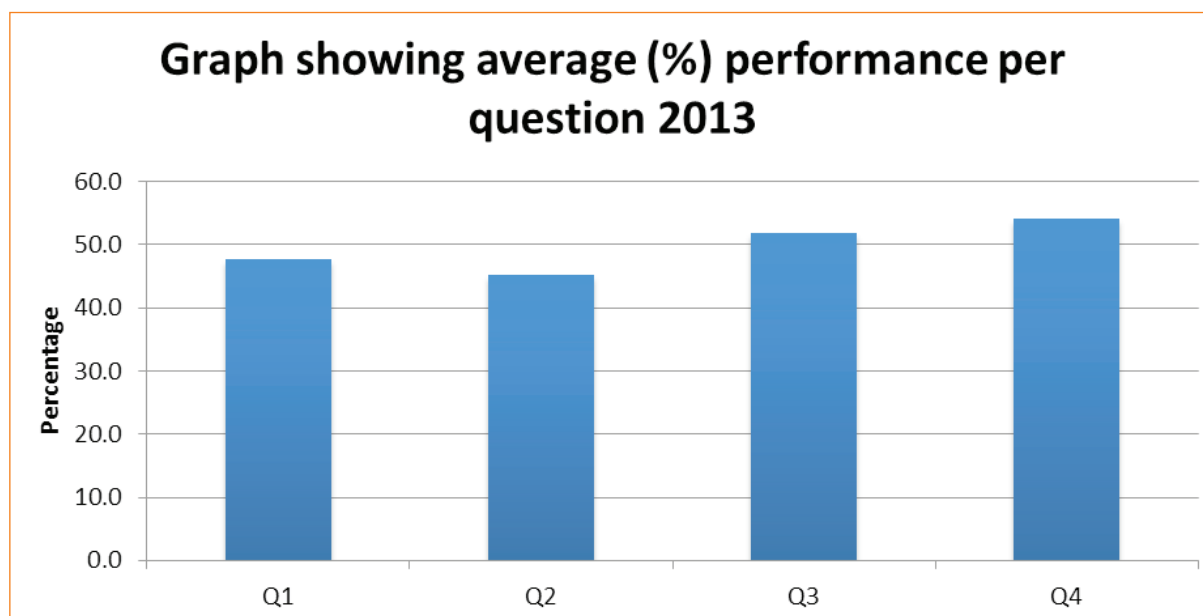
- (d) The action verbs such as ‘discuss’, ‘explain’, ‘outline’, ‘describe’, etc. should be clearly explained to learners. Learners must ensure that they know whether causes, impacts or measures to reduce impacts are being asked and not merely answer based on the facts/content that they know.
- (e) Teachers should focus on the interpretation of diagrams, sketches, photographs, cartoons and graphical data. The learners should be taught how to draw on information from different sources. Teachers and learners must be aware that different sources may also be combined for examination purposes.
- (f) Where alternative terms exist for a specific concept, learners must be provided with all possible terms and not only the term preferred by the teacher.
- (g) Learners should be taught paragraph-writing and interpretation techniques. Areas which need attention are repetition and poor punctuation.
- (h) Subject advisers should make sure that all teachers expose learners to questions that require answers in paragraph form. It is important that teachers give learners regular feedback on the mistakes that they have made.
- (i) Many learners do not read questions properly. They see common words and fail to determine what the question actually requires of them. Learners should be guided in developing techniques for the interpretation of questions; for example, the practice of underlining key words.
- (j) Teachers should share information and ideas. The internet has a wealth of information.
- (k) As life-long learners, teachers must stay abreast of new developments in their subjects. These changes could be incorporated into internal tests/examinations as contextual questions.

### 7.3 DIAGNOSTIC QUESTION ANALYSIS FOR PAPER I (2013)

**Table 7.3.1: Average marks per question expressed as a percentage in Paper 1 (2012 – 2013)**

Q. No	Topic	Maximum	Average 2012	Average 2013
1	Climate and weather, fluvial processes and structural landforms	100	38.7	47.6
2	Climate and weather, fluvial processes and structural landforms	100	27.4	45.3
3	People and places: rural and urban settlements, people and their needs	100	39.9	51.8
4	People and places: rural and urban settlements, people and their needs	100	34.0	54.1

Figure 7.3.1: Average marks per question expressed as a percentage in Paper 1 (2013)



The significant increase in averages per question is very gratifying. It is an indication that there is an improvement in the teaching and learning process. There is, however, still room for improvement.

## 7.4 ANALYSIS OF LEARNER PERFORMANCE IN INDIVIDUAL QUESTIONS

### QUESTION 1: Climate and Weather, Fluvial Processes and Structural Landforms

This was a popular choice question answered by most candidates.

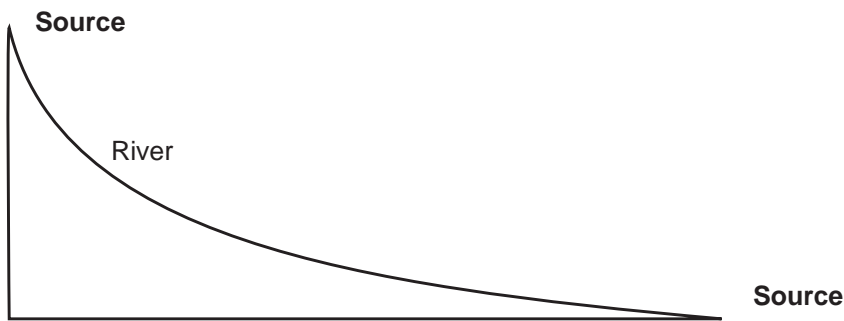
#### Common errors and misconceptions

- Many candidates assumed that the term, *pollution dome* was the same as the term, *heat island* (Q 1.3). This misinterpretation resulted in poor performance.
- Many candidates did not understand the concept of the *longitudinal profile of a river* (Q 1.5.2). Candidates therefore tried to fit their answers to their knowledge of a cross profile of a river.
- Most candidates could identify the *meandering stream channel pattern*, but they could not explain why it developed (Q 1.5.6).
- Most candidates could identify the *tor*, but could not explain its development (Q 1.6.4).

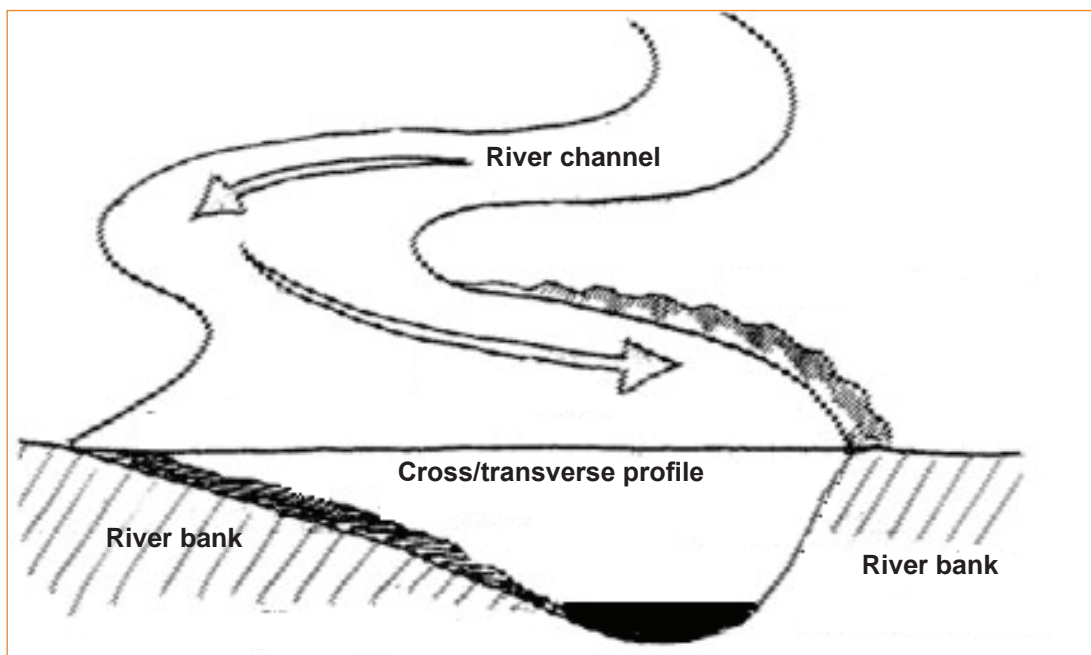
#### Suggestions for improvements

- The difference between similar concepts should also be explained to the learners. For example, *heat island* and *pollution dome*, and *longitudinal profile* and *cross profile*. These concepts must be explained with suitable sources/diagrams to clearly show the differences. These concepts are important as they may also be tested (see CAPS).

- An *urban heat island* refers to a pocket of warm air that exists over an urban settlement. This pocket of warm air is surrounded by the cooler air of the surrounding area. The height of the urban heat island varies during the course of the day. The *pollution dome* is related to the urban heat island. The urban heat island forms an inversion layer from which the pollution particles above the city cannot escape. The pollution dome is therefore the visible layer of pollution trapped above the city. The height of the pollution dome will therefore be dependent on the height of the urban heat island. During daytime, the urban heat island will extend vertically (be higher) as the atmosphere is warmed, and warm air tends to rise. At night, the urban heat island will be compressed (be lower). The atmosphere cools down during the night and becomes heavier and denser. The cooler air will therefore subside and push the urban heat island down.
- The *longitudinal profile* of a river shows the shape of a river's profile from its source to its mouth.



The *cross/transverse profile* shows a cross-section, anywhere along the course of a river, through the river channel; it is from the one bank to the other bank of the river channel.



- (b) The concept of river profile should be taught using of a variety of diagrams.
- (c) Teachers **must** focus on the **development** of landforms. In the final examination it is expected of candidates to identify landforms and to explain the development of those landforms. The explanation of the development of landforms should be tested in all internal tests and examinations.
- (d) Action words such as *impact* and *account for* must be explained to learners. Learners must be given questions which include a variety of these action words.



## QUESTION 2: Climate and Weather, Fluvial Processes and Structural Landforms

This was the least popular question and many candidates opted not to answer it. It also indicated the lowest average of all questions.

### Common errors and misconceptions

- (a) Many candidates struggled with the reading and interpretation of the synoptic weather map (Q 2.3).
- (b) Many candidates identified the entire low pressure system rather than the *cold front* which is part of the low pressure system (Q 2.3.4)
- (c) Candidates did not understand the conditions associated with the passage of a *cold front* (Q 2.3.5).
- (d) Although some candidates understood the concept of a *flow hydrograph*, they could not explain how a flow hydrograph could be used by farmers (Q 2.5.2).
- (e) Many candidates did not understand the relationship between *infiltration* and *discharge* (Q 2.5.3).
- (f) Candidates struggled to associate *slope instability* with *mass movement* (Q 2.6.6).

### Suggestions for improvement

- (a) The interpretation of synoptic weather maps must be done in detail in class. It is important for teachers to expose learners to synoptic weather maps of different seasons in order to note the specific differences that can be observed.
- (b) Teachers must explain the difference between identifying a system and identifying part of a system, e.g. the cold and warm fronts are part of a mid-latitude cyclone.
- (c) Learners should not only know the concept of a *cold front*, but they must understand and know the reasons for certain weather conditions associated with it. When a cold front approaches, the following weather changes can be expected:
  - temperature drops as cold air follows the cold front;
  - atmospheric pressure increases as cold air following the cold front is heavy and dense;
  - more clouds form as warm air ahead of the cold front is forced to rise, resulting in condensation and cloud formation;
  - precipitation increases as clouds that form along the cold front are rain-bearing;
  - humidity decreases as cold air following the cold front is heavy and dense; and
  - winds back as air rotates clockwise around a low pressure cell in the southern hemisphere
- (d) Learners must know not only how to interpret a *flow hydrograph*, but also how it can be used.
- (e) Questions on *slope elements/forms* are commonly asked in question papers. The development and utilisation of these must be taught by teachers. Note that slope elements/forms are now part of Grade 11 CAPS.

- (f) Learners must be taught the relationship between key concepts: for example, how *slope instability* will contribute to *mass movement*. The more unstable the slope, the greater the likelihood of mass movements. Note that slope mass movements is now part of Grade 11 CAPS

### QUESTION 3: People and Places: Rural and Urban Settlements, People and Their Needs

Candidates performed fairly well in this question. It was a popular choice and scored a high average.

#### Common errors and misconceptions

- (a) Many candidates gave the *reasons* for rural-urban migration, rather than the *impact* of rural-urban migration (Q 3.3.3).
- (b) Many candidates do not understand the term, *Gross Domestic Product* (Q 3.5.1).
- (c) Most candidates did not know what an *Industrial Development Zone* is (Q 3.6.1).
- (d) Candidates did not know the meaning of the term, *incentives* (Q 3.6.1).

#### Suggestions for improvement

- (a) Questions on the *Gross Domestic Product (GDP)* of South Africa are commonly asked in the examination. This concept must be well-understood in terms of the economic development of South Africa.
- (b) Teachers must keep up-to-date with economic development in South Africa, for example the development of *Industrial Development Zones (IDZs)*. Changes in economic development in South Africa should be brought to the attention of the learners.
- An *Industrial Development Zone (IDZ)* is a modern industrial zone developed to attract export driven industries aimed at economic development and the development of skills.
  - Incentives are positive things put in place to attract industries to IDZs, for example tax reductions/rebates for some activities and products, reduced costs when importing raw materials, support in terms of innovation and research, subsidies, reduced service costs, tax holidays and the availability of industrial sites at cheaper rates to mention but a few.

### QUESTION 4: People and Places: Rural and Urban Settlements, People and Their Needs

This question was answered fairly well.

#### Common errors and misconceptions

- (a) Most candidates could not select an appropriate term for the given descriptions. This is an indication that learners lack knowledge of the basic concepts.
- (b) Many candidates struggled with the interpretation of the cartoon (Q 4.3).
- (c) Many candidates provided *solutions* rather than the *effects* of HIV/Aids.
- (d) Many candidates experienced problems interpreting the graph (Q 4.6).
- (e) Some candidates did not understand the term, *trade relations*. They could not distinguish between basic concepts such as *imports* and *exports* (Q 4.6.3).

- (f) Candidates could not provide *advantages* and *disadvantages* of trade with China and wrote about general relationships between the two countries (Q 4.6.5).

### Suggestions for improvement

- (a) Learners must show a common understanding of basic concepts by being able to provide definitions for specific concepts/terms used in Economic Geography.
- (b) Learners should be exposed to the use of cartoons and their interpretation thereof.
- (c) Basic concepts such as *imports* and *exports* must be taught thoroughly to ensure that more difficult concepts within the Economic Geography section are understood. For example:
- *Exporting* is the term used when one country sells goods to another country;
  - *Importing* is the term used when one country buys goods from another country; and
  - When countries buy or sell goods from one another, a *trade relationship* exists between the two countries.
- (d) The topic of trade relations with other countries should be taught within the framework of *globalisation*. Note that globalisation is now part of Grade 11 CAPS. As globalisation is a current issue which affects all countries in the world, this concept must be clearly understood as it might have an impact on economic activities that will be studied in Grade 12 CAPS.

## 7.5 OVERVIEW OF LEARNER PERFORMANCE IN PAPER 2 IN 2013

### General comments

- (a) The question paper was well received by educators and candidates. Comments were that the paper was of a fair standard, but slightly more difficult than in past papers. Candidates had enough time to finish the question paper. All cognitive levels were covered and all learning outcomes assessment standards were tested. The sources used, the topographical map, the orthophoto map and other sketches, assisted candidates because they were clear and visible.
- (b) The question paper was within the capabilities of the Grade 12 Geography candidates. It appears that second- and third-language candidates cannot express themselves clearly in English .
- (c) Candidates penalize themselves because they do not read instructions, or use the given information (photos) to help/support their responses.
- (d) Middle- to higher-order questions posed a great challenge to the candidates.
- (e) In response to Q3, where practical application was required, candidates tended to refer to personal experiences, rather than interpretation of the topographic map or orthophoto.
- (f) Fundamental knowledge of calculations is still lacking. It appears that many teachers are not well-versed in the various calculation techniques. This is apparent from the fact that all, or at least many, candidates from an examination centre do not attempt the calculations.
- (g) The fundamental knowledge of GIS is still lacking. It appears that many teachers are not well-versed in GIS. This is apparent from the fact that all, or many, candidates from an examination centre do not attempt to answer questions on GIS.

### General suggestions for improvement

- (a) Teachers should help learners to relate the orthophoto map to a specific area on the topographic map, using latitude and longitude.
- (b) Teachers should work together in cluster meetings and assist in setting common papers that are more practical.
- (c) The learners must be taught to recognise small differences in the choice of answers given in multiple-choice questions. Further, teachers should be trained in the setting of multiple-choice questions.
- (d) The Geomorphology and Settlements sections of CAPS must be taught by integrating topographic maps.
- (e) Teachers should use what is at their disposal to teach the learners. For example, they could go outside the class to demonstrate certain features and characteristics of features. Taking learners on excursions would be a bonus.
- (f) The integration between theory and mapwork must be taught in the classroom. Teachers should also emphasise the importance of geographic terminology in tests and examinations. For example, candidates often use words such as 'left' and 'right' instead of north, south, east or west.
- (g) Teachers must be trained in mapwork calculation techniques and GIS.
- (h) All schools should have a variety of topographic maps and orthophoto maps available at their schools as invigilators are instructed to collect these resources at the end of the examination. Teachers should use these resources and examination papers for the purpose of practising in class. All NSC examination papers can be used for practising purposes in CAPS as the content remains the same. Take note, however, that mark allocations will differ in CAPS.

### General comments for Paper 2

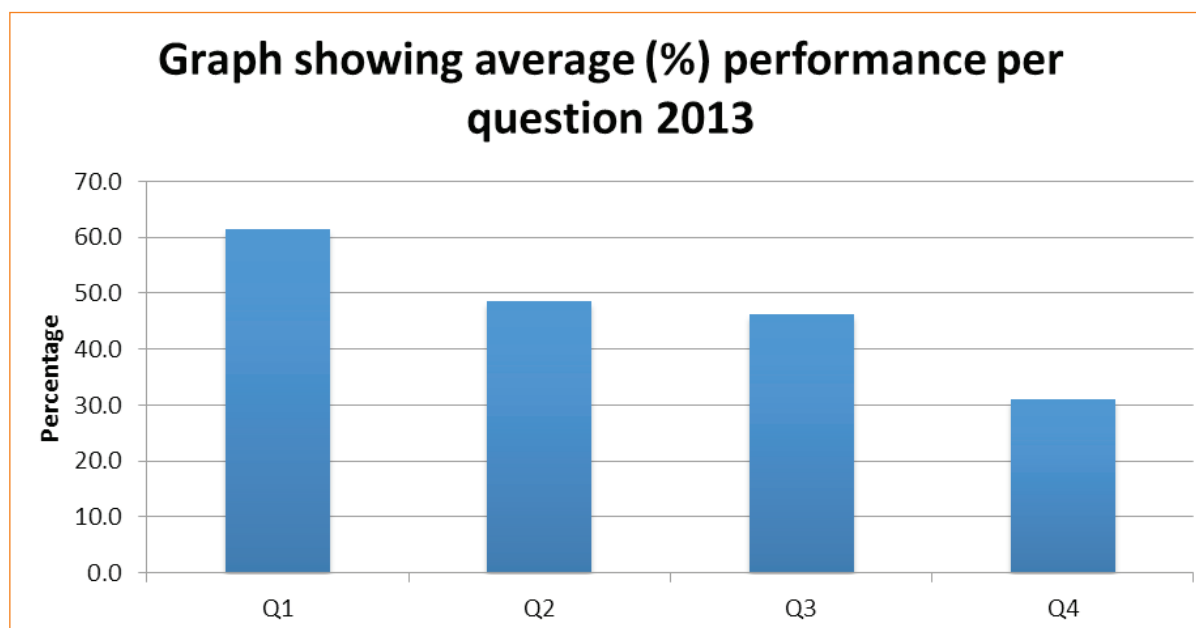
- (a) The teaching of map and photo interpretation is not purely textbook-based. Teachers must make sure that all topographic maps and orthophoto maps are kept safely at school. These topographic and orthophoto maps are valuable resource materials that should be used on a regular basis.
- (b) The integration of theory and mapwork cannot be emphasised enough. Learners must be made aware that Geography Paper 1 and Geography Paper 2 are inter-related and not two separate entities. When certain concepts are taught in the theory section of Geography, this knowledge must be applied in mapwork.

## 7.6 DIAGNOSTIC QUESTION ANALYSIS FOR PAPER 2 (2013)

Table 7.6.1: Average marks per question expressed as a percentage in Paper 2 (2012 – 2013)

Q. No	Type of question/topic	Maximum	Average % 2012	Average % 2013
1	Multiple-choice questions	20	69.5	61.4
2	Calculations and application	20	40.8	48.5
3	Application and interpretation	40	41.6	46.3
4	Geographical Information Systems (GIS)	20	45.6	30.9

Figure 7.6.1: Average marks per question expressed as a percentage in Paper 2 (2013)



The increase in the average percentage for QUESTION 2 is gratifying. As many learners struggle with mapwork calculations, it shows an improvement in the number of learners getting to grips with it. The same can be said regarding QUESTION 3, which deals with application and interpretation. The strong downward trend in QUESTION 4 is disconcerting. GIS is a component which many teachers and learners alike are struggling to comprehend. A tremendous effort must be made to improve understanding of GIS.

## 7.7 ANALYSIS OF LEARNER PERFORMANCE IN INDIVIDUAL QUESTIONS

### QUESTION 1: Multiple-Choice Questions

Candidates performed well in this question.

#### Common errors and misconceptions

- Candidates had poor knowledge of conventional signs.
- Many candidates did not know how to use the map index.
- Candidates had little knowledge of concepts such as *stream order* (Q 1.4) and *shape of slope* (Q 1.5).

#### Suggestions for improvement

- Learners must be taught to use the information supplied at the bottom of the map, for example the projection used to draw the map, map symbols, magnetic declination, contour interval and map code, because this will make answering Question 1 easier.
- Teachers should emphasise the use of conventional signs, and that learners should study the key of the map before attempting to answer questions. More tasks on the conventional signs can assist the learners.
- Learners should not only know the different types of landforms and slopes; they should also be able to identify them on the map and in the surrounding environment.
- Slopes and landforms should be taught with simple hand-drawn contour maps.

## QUESTION 2: Calculations and Application

### Common errors and misconceptions

The common errors that candidates made were:

- (a) calculating area (Q 2.1);
- (b) determining magnetic declination (Q 2.2); and
- (c) map referencing (Q 2.3);

### Suggestions for improvement

- (a) The following exercise/activity could be undertaken to overcome challenges relating to the calculation of area:
  - Follow the steps in the example given below as this will allow learners to score full marks in the final examination paper;
  - Refer to the following example, which is Q2.1 in the November 2013 examination paper: Refer to the topographical map and calculate the area of the space labelled *Area of Orthophoto Map* in km<sup>2</sup>;
  - Show ALL calculations/steps followed; and
  - The formula to calculate area is:  $Area = Length \times Breadth$ .

The length and the breadth of the Orthophoto Map, as indicated on the topographic map, must be calculated in km. The formula given below can be applied to all maps with different scales. By using a universal formula, errors made by teachers and learners alike should be reduced.

$$\begin{aligned} \text{Length} &= \frac{\text{map distance (mm)} \times \text{map scale denominator}}{1\,000\,000} \\ &= \frac{97 \text{ mm} \times 50\,000}{1\,000\,000} \\ &= \frac{4\,850\,000}{1\,000\,000} \end{aligned}$$

$$\begin{aligned} \text{Breadth} &= \frac{\text{map distance (mm)} \times \text{map scale denominator}}{1\,000\,000} \\ &= \frac{63 \text{ mm} \times 50\,000}{1\,000\,000} \\ &= \frac{3\,150\,000}{1\,000\,000} \\ &= 3,15 \text{ km} \end{aligned}$$

$$\text{Area} = \text{Length} \times \text{Breadth}$$

$$= 4,85 \text{ km} \times 3,15 \text{ km}$$

$$= 15,28 \text{ km}^2$$

(b) Magnetic declination was tested in the 2012 Geography Paper 2 Examination. In 2013, the calculation was taken one step further as candidates also had to calculate magnetic bearing. Despite the step-by-step explanation of the process in the 2012 National Diagnostic Report on Learner Performance, candidates performed poorly in this question. The following exercise/activity could be undertaken to overcome challenges relating to the calculation of magnetic declination:

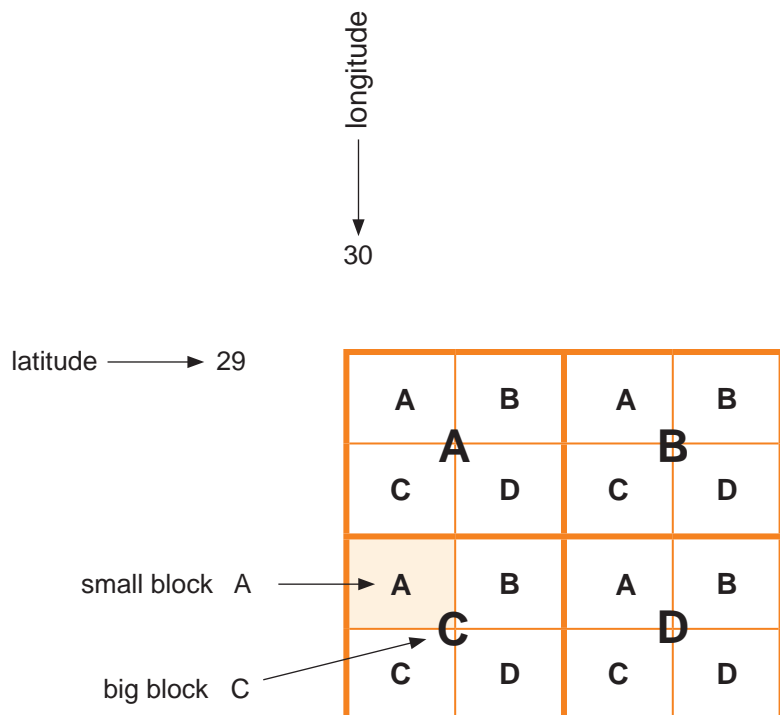
- Follow the steps in the example given below as this will allow learners to score full marks in the final examination paper. The method below is set out in a logical fashion, following a specific sequence in order for candidates to answer in an organised way. An organised answer assists in the marking process.
- Refer to the following example, which is the question used in the November 2013 examination paper. It is Question 2.2: Using the information on the topographical map, calculate the magnetic bearing of the reservoir from trigonometrical station 156 for the year 2013.
- Show ALL calculations/steps followed. The desired answer is:

<u>Date of map:</u>	2002	Find printed below the map.
<u>Magnetic declination 2002:</u>	22°42'W	Find printed below the map.
<u>Mean annual change:</u>	12'W	Find printed below the map.
<u>Difference in years:</u>	11	2013 – 2002 (The current date will always be the year you are in).
<u>Total annual change:</u>	132'W/2°12'W	Mean annual change (12) x difference in years (11) = 132'W. Change 132'W to degrees and minutes
<u>Magnetic declination 2013:</u>	24°54'W	Magnetic declination 2002 (22°42'W) + total annual change (2°12'W)
<u>Magnetic bearing:</u>	335°54'W	Magnetic bearing (311°) + magnetic declination 2013 (24°54'W)

- Teachers should do similar exercises on as many different maps as possible to get a variety of answers. Using only ONE map will not give learners enough exercises, as the majority of readings will be the same.

(c) The diagram below should be used to explain the concept of map referencing. The map reference of topographic map 2930CA MERRIVALE is used as an example:

- 29 refers to latitudinal position;
- 30 refers to longitudinal position;
- The first letter (C) refers to big block C; and
- The second letter (A) refers to small block A in big block C.



- (d) Calculation problems can be resolved through continual exercise, in the form of classwork and/or homework. Calculation problems cannot be solved if learners are given limited exercises.
- (e) Ensure that all areas of calculations are covered and that learners know how to follow the steps when doing calculations, as calculation steps are awarded marks.
- (f) Building of models by using contour lines will allow learners immediately to see the correlation between contour lines, landforms and slopes.
- (g) Learners must be shown how to identify landforms and slope types on topographical and orthophoto maps. This should be included in regular practice tests and exams.
- (h) All calculations should be taught from Grade 10 already and practised regularly.
- (i) All units of measurement must be included. Marks are lost if units of measurements are not included.
- (j) Learners must familiarise themselves with all the different formulas.

### QUESTION 3: Application and Interpretation

#### Common errors and misconceptions

Common errors made by candidates include the following:

- (a) Not applying theoretical concepts to the topographic map and orthophoto map.
- (b) Not being able to identify features studied in theory on topographic map and orthophoto map.
- (c) Candidates could not orientate the topographic map and the orthophoto map.
- (d) Candidates could not find similar features on the topographic map and the orthophoto map.



- (e) Many candidates did not take the scale of the topographic map and the orthophoto map into account. When, for example, the distance between two points on the topographic map was 20 mm, they also measured 20 mm on the orthophoto map.
- (f) Many candidates did not use their theoretical knowledge in answering mapwork questions.

### **Suggestions for improvement**

- (a) Regular and correct use of geographical concepts in class to improve learners' understanding thereof.
- (b) Continual integration of content knowledge with mapwork must be introduced as early as Grades 10 and 11.
- (c) Teachers must give regular worksheets to learners to improve map reading and interpretation skills.
- (d) Teachers should expose learners to previous examination papers where similar questions and questions of the correct difficulty levels are provided.
- (e) Exercises to identify landforms and drainage patterns on topographic maps when those concepts are taught in theory must be practised in class.
- (f) Exercises to identify settlement outlines, street patterns and land use zones on topographic maps when those concepts are taught in theory.
- (g) Learners must be taught that scale influences distances between similar points when measured on the topographic map and orthophoto map respectively. Teachers must emphasise that the scale of the topographic map is 1:50 000 while the scale of an orthophoto map is 1:10 000.
- (h) Learners must be taught how to orientate the topographic map with the orthophoto map.

## **QUESTION 4: Geographical Information Systems (GIS)**

### **Common errors and misconceptions**

- (a) Many candidates did not understand the concept of *spatial resolution*.
- (b) Basic concepts such as *data analysis* and *data layering* are not understood.
- (c) Candidates could not provide uses of data layering.

### **Suggestions for improvement**

- (a) Learners must be conversant in GIS terminology. Definitions are often asked as part of GIS.
- (b) Teachers should encourage learners to make a glossary of GIS terms.
- (c) GIS concepts must be taught in context. While it is important for learners to know the concepts and be able to define them when required to, learners must be able to apply the concepts in practical life situations. Teachers must therefore be aware of the fact that GIS will not just consist of theory and definitions but rather be practically applied to the map examined.
- (d) Teachers are advised to create scenarios to challenge learners to apply their understanding of concepts and to apply GIS knowledge across the various topics of the subject (integration). Learners:

- could be required to apply GIS in flood prevention (buffering);
  - must be able to apply GIS in choosing a site for the development of a settlement (data layering);
  - must be able to create a new map from different types and sizes of maps (data integration);
  - must know that GIS can contribute in solving social and environmental challenges; and
  - must be aware that GIS can be used to manage various issues; for example, disasters and crime.
- (e) Teachers must integrate GIS knowledge across the various topics of the subject. Learners could be asked to apply GIS concepts to Climate and Weather, Fluvial Processes, People and Places and People and their Needs. By so doing, learners will know that GIS can contribute to solving social and environmental challenges.
- (f) There should be reference to previous question papers to get an idea as to how GIS questions are set. Teaching approaches should be adapted accordingly.
- (g) Teachers should make use of resources provided by various government departments, for example the Department of Basic Education and the Department of Rural Development and Land Reform. All teachers must acquire the DBE Mapwork Study Guide.
- (h) Teachers should devote ample time to planning GIS lessons. The curriculum currently requires learners to know and apply the GIS concepts. In developing lessons, teachers should make it priority to communicate the material in a meaningful way that takes cognisance of learners' personal experience.

## CHAPTER 8

### HISTORY

The following report should be read in conjunction with the History question papers of the November 2013 Examination.

#### 8.1 PERFORMANCE TRENDS (2010 – 2013)

14 567 more candidates wrote the History examination in 2013. Since 2010, there has been a consistent improvement in the percentage of candidates passing the subject at both the 30% and 40% intervals. In 2013 the percentage of candidates passing History at 40% increased by 2.1% and at 30% by 1.1 percentage points compared to 2012. Improved learner performance in History as an NSC subject augurs well for improved social cohesion and values in the country, and is indicative of substantive improvement in subject coverage in the schools where the subject is taught.

**Table 8.1.1: Overall achievement rates in History**

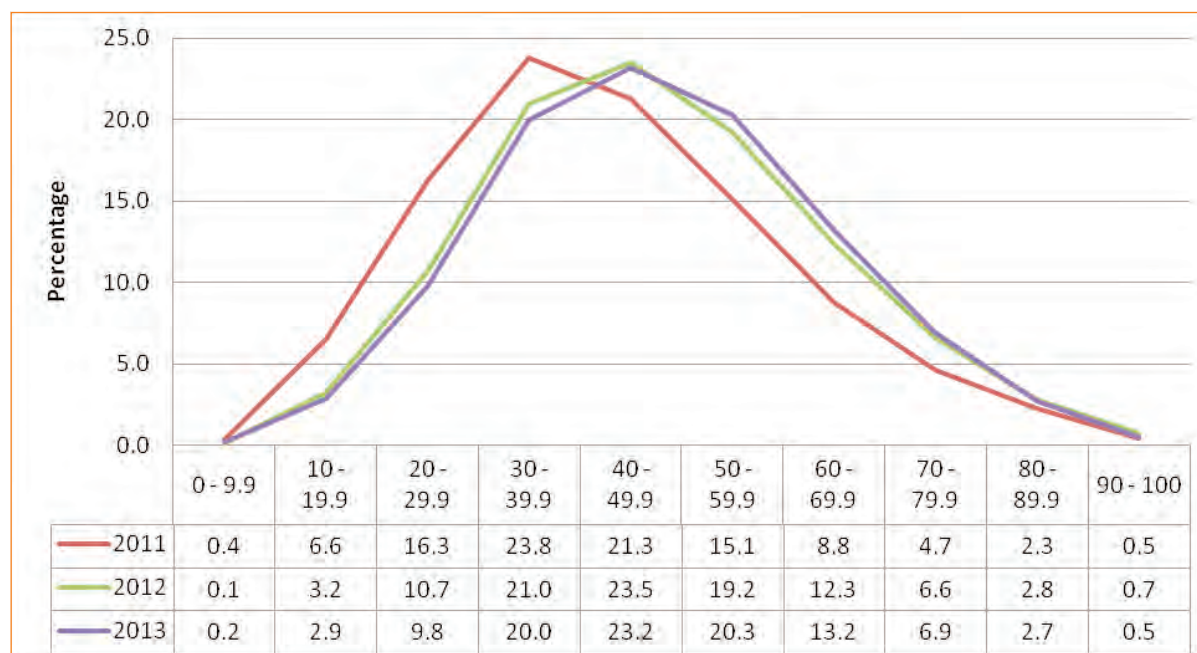
Year	No. Wrote	No. Achieved @ 30%	% Achieved @ 30%	No. Achieved @ 40%	% Achieved @ 40%
2010	87 676	66 429	75.8%	46 042	52.5%
2011	85 928	65 239	75.9%	45 277	52.7%
2012	94 489	81 265	86.0%	61 403	65.0%
2013	109 046	94 982	87.1%	73 136	67.1%

The table above shows that that candidates' performance at the 30% and 40% level has been consistently on the increase over the last four years.

**Figure 8.1.1: Overall achievement rates in History**



**Figure 8.1.2: Performance distribution curve (History: 2011 – 2013)**



There was a decrease in the percentage of candidates who performed at 10–39.9% in 2013. It is also encouraging to see an increase in the proportion of candidates who performed at the level of 50% and above.

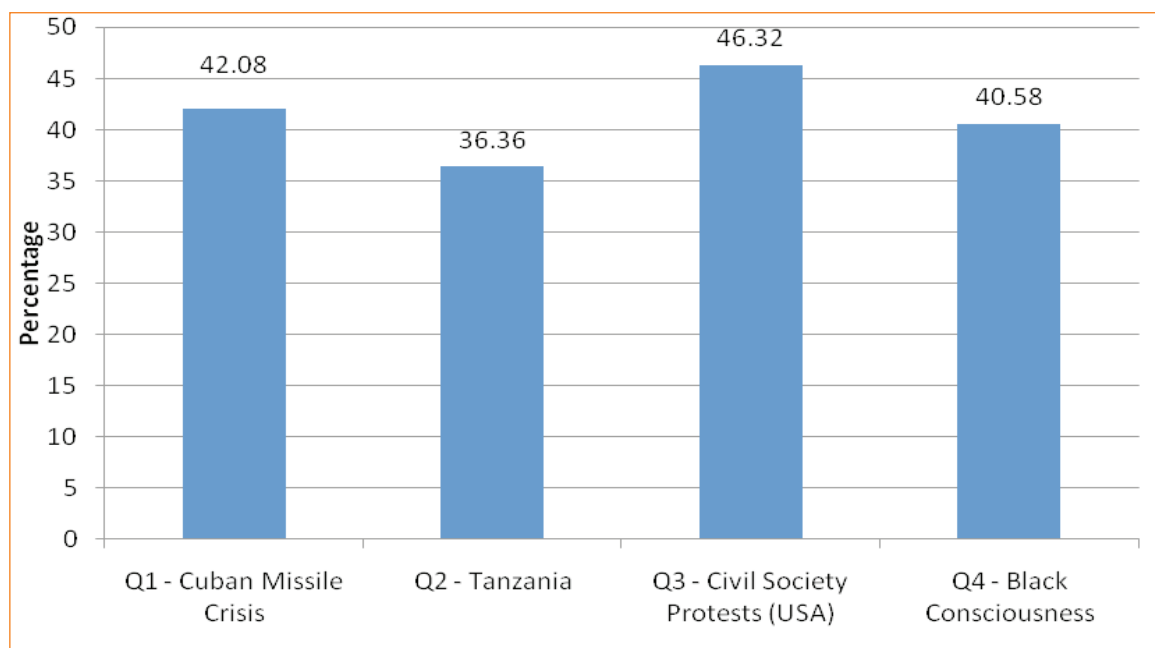
## 8.2 OVERVIEW OF LEARNER PERFORMANCE IN PAPER I

- (a) Generally, candidates' performances in this question paper ranged from fair to good. Reports from PEDs indicated that candidates performed better overall than in previous years.
- (b) The majority of candidates completed the paper in the allocated time.
- (c) The sources in the addendum were interesting; difficult words were explained in the text, which made the sources candidate-friendly.
- (d) Successful candidates, some of whom obtained full marks, were able to interpret, analyse, evaluate and synthesise evidence from the given sources, and also use their own knowledge. They were able to comment on the usefulness, limitations and bias of the sources. With regard to paragraph and extended writing questions, candidates were able to construct an original argument, and were able to synthesise evidence from the sources to construct an original argument.
- (e) Candidates who performed poorly displayed a weak command and understanding of the English language. It is evident that some candidates had scant content knowledge and simply could not answer the questions posed. Moreover, some candidates appeared to be ill-prepared and had not studied hard enough. In addition, many candidates were unable to choose the most useful source and write a paragraph.

### 8.3 DIAGNOSTIC QUESTION ANALYSIS FOR PAPER I

The graph below is based on a sample of scripts analysed. Question 3 (Civil Rights in the USA) was the best-answered question. Question 2 (Tanzania) and Question 4 (Black Consciousness) were the more poorly answered questions. Even though there was no improvement in performance for Question 2, it is particularly encouraging that there was an improvement in performance in Questions 1, 3 and 4.

**Figure 8.3.1: Average marks per question in Paper 1 expressed as a percentage**



### 8.4 ANALYSIS OF LEARNER PERFORMANCE IN INDIVIDUAL QUESTIONS IN PAPER I

Generally, the candidates' performances ranged from fair to good. Most candidates performed fairly well in the source-based questions, while many candidates struggled to provide sound responses to the paragraph (especially where the question required the candidate to select ONE source and explain its usefulness) and extended-writing questions.

It appeared that numerous centres lacked appropriate resources such as textbooks, especially such as adequately covered the new theme (Cuban Missile Crisis). It was also apparent that limited exposure to examination-type questions had disadvantaged many candidates.

Candidates who attempted Question 1, Question 2 and Question 4 performed poorly, because of a lack of appropriate content knowledge. This is an area requiring urgent attention.

#### Common errors and misconceptions regarding source-based questions

(a) Many candidates performed poorly on the following source-based questions:

- Q1 (1.1.3; 1.1.4; 1.1.5; 1.2.2; 1.3.2);
- Q2 (2.1.5; 2.2.2; 2.2.3; 2.2.4);
- Q3 (3.1.5; 3.2.2; 3.3.5); and
- Q4 (4.1.3; 4.1.4; 4.3.1; 4.3.2; 4.3.3; 4.4).

- (b) The majority of the learners are English additional language speakers and hence experienced difficulty in interpreting some of the questions as they were unable to use the sources to determine usefulness and bias, compare evidence; or interpret and analyse information.
- (c) Words such as 'limitations', 'bias' and 'similarities' also contributed to candidates' poor performance. It is important that learners be familiar with such terms.
- (d) Candidates displayed poor content knowledge, especially of theme 1 (the Cuban Missile Crisis), which appeared to have been neglected by some centres, where this problem seems to be a recurring challenge.
- (e) Many candidates, especially among FAL learners, displayed a lack of reading, writing and language skills.
- (f) It was evident that there was a lack of appropriate resources, especially for the new theme.

### **Common errors and misconceptions regarding paragraph questions**

- (a) Many candidates performed poorly on the following paragraph questions:
  - Q. 1.4;
  - Q. 2.4;
  - Q. 3.4; and
  - Q. 4.5.
- (b) For the following reasons, many learners were unable to construct reasonable paragraphs:
  - inability to choose/select ONE source that is useful;
  - poor language and writing skills, which resulted in poorly constructed paragraphs;
  - inability to summarise points coherently within the 80-word limit/8 lines;
  - inability to use own knowledge to write an organised paragraph in response to the question posed and substantiate responses with suitable evidence;
  - the recurring problem of the use of bullets such as is not acceptable in the writing of paragraphs; and
  - inability to synthesise the given information as reflected in their copying of the information directly from the sources provided; in some centres, learners resorted to copying verbatim from the sources, which resulted in a zero mark.

### **Common errors and misconceptions regarding extended writing (level 1) questions**

- (a) Many candidates performed poorly on extended writing questions:
  - Q1.5.1;
  - Q2.5.1;
  - Q3.5.1; and
  - Q4.6.1

- (b) Many candidates wrote generally about the Cold War; the different forms of Civil Society Protest and Black Consciousness, without making reference to the Cuban Missile Crisis or the Freedom Riders and/or offered vague and generalised accounts of Steve Biko's contribution instead of focusing on the role and impact of the philosophy of the Black Consciousness Movement in the 1970s.
- (c) Many candidates were unable to write a logical essay. Furthermore, they displayed the following:
- inability to write a coherent, well-balanced and structured essay following a given line of argument;
  - inability to synthesise the information on the different forms of the Civil Rights Movement; the detection of Soviet missiles in Cuba by the USA, contributing to tensions between the superpowers; and those who attempted these questions came with prepared essays;
  - technical flaws – no introduction; lack of a logical, coherent argument and conclusion;
  - failure to attempt the question; inadequate content; responses mostly irrelevant and superficial;
  - lack of the necessary skills to discuss the different forms of protest that the Civil Rights activists embarked upon in the 1960s; most candidates gave a narrative account of the protest action;
  - absence of analysis and historical explanation; and
  - use of the telegraphic approach.

#### **Common errors and misconceptions regarding extended writing (level 2) questions**

- (a) Many candidates performed poorly on extended writing questions, i.e:
- Q1.5.2;
  - Q2.5.2;
  - Q3.5.2; and
  - Q4.6.2.
- (b) Many candidates were unable to write this type of essay – which required the use of evidence from the sources together with own knowledge. Usually, the candidate that attempted this genre of writing fell far short of the requirements. Moreover, they displayed the following:
- no attempt to focus on the topic;
  - technical flaws – lack of introduction, analysis and conclusion;
  - poor or no historical knowledge of the topic;
  - very little evidence of interpretation, analysis and the ability to construct an original argument; little or no exposure to the demands of this genre of writing and how the holistic rubric is used to assess answers; and
  - copying of information directly from the sources; very little evidence of interpretation and analysis and inability to construct an original argument.

## 8.5 OVERVIEW OF LEARNER PERFORMANCE IN PAPER 2

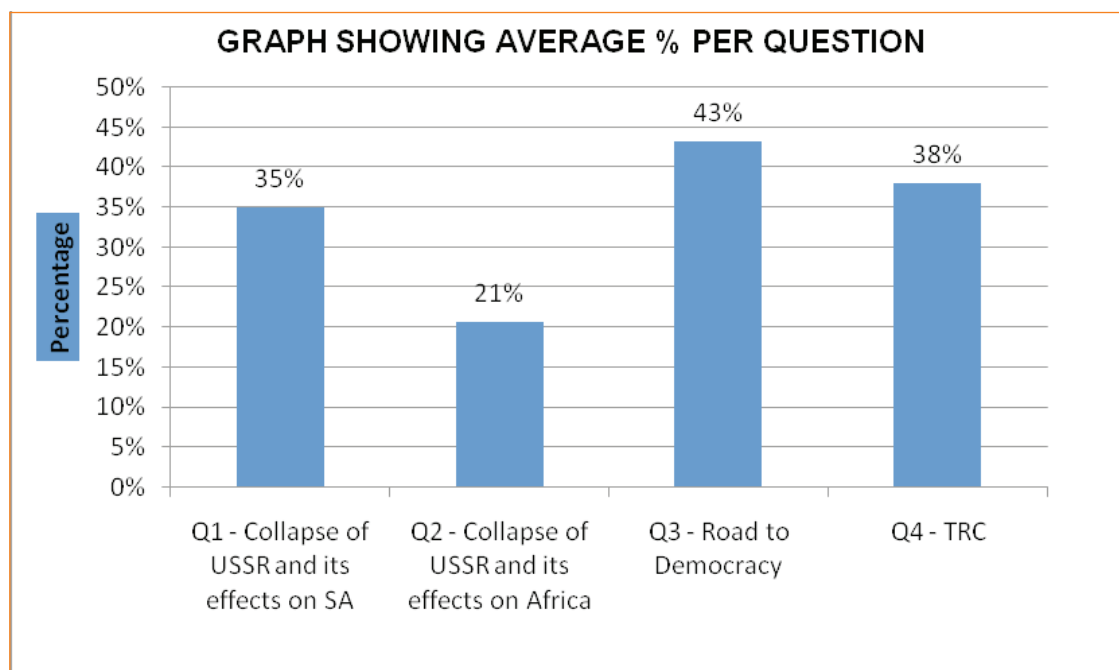
- (a) Generally, candidates' performances in this question paper ranged from fair to good.
- (b) In the main, most questions (Questions 3 and 4) were well answered. There seems to be an improvement in the quality of candidates' responses. Candidates who attempted Questions 3 and 4 performed better than those who attempted questions 1 and 2. Question 2 required the candidate to analyse a case study (Angola). The resources on this theme are currently limited.
- (c) Some candidates had a thorough understanding of the content of and the associated historical skills required to answer the sourced-based and extended writing questions, which enabled them to obtain full marks. Generally, these candidates excelled in answering source-based questions because they were able to interpret, analyse, evaluate and synthesise evidence from both the sources and their own knowledge. They were also able to comment on the usefulness, fairness and similarity of the sources. With regard to paragraph and extended-writing questions, learners were able to construct an original argument by using the evidence from the sources together with their own knowledge.
- (d) Learners were also able to sustain and defend a coherent and balanced line of argument and to synthesise evidence from the sources so as to construct an original argument.
- (e) Most candidates completed the paper within the allocated time.
- (f) Candidates who performed poorly generally displayed a poor command and understanding of the English language. It is evident that some candidates had scant content knowledge and simply could not answer the questions.

## 8.6 DIAGNOSTIC QUESTION ANALYSIS FOR PAPER 2

The figure below is based on a sample of scripts analysed. Question 3 (Road to Democracy) was the better answered question. Question 1 (Collapse of the USSR and its effects on SA) and Question 2 (Collapse of the USSR and its effects on Africa) were relatively poorly answered. Apart from Questions 1 and 2, there was an improvement in the performance of candidates in Questions 3 and 4. This is particularly encouraging.



**Figure 8.6.1: Average marks per question in Paper 2 expressed as a percentage**



Q1	Collapse of USSR and its effects on SA
Q2	Collapse of USSR and its effects on Africa
Q3	Road to Democracy
Q4	TRC

## 8.7 ANALYSIS OF LEARNER PERFORMANCE IN INDIVIDUAL QUESTIONS IN PAPER 2

Generally, Questions 1 and 2 were poorly answered. It was evident that candidates had a lack of content knowledge.

Because Angola is a new theme, textbooks are not covering this theme adequately.

The general trend from the PEDs is that more learners are opting to answer Questions 3 and 4. The reason for this might be that there are adequate resources (textbooks, DVDs, newspaper articles, etc) on the Road to Democracy and the TRC.

### Common errors and misconceptions regarding source-based questions

(a) Many candidates performed poorly on the following source-based questions:

- Q1 (1.2.1; 1.2.2; 1.3; 1.4.1; 1.4.2; 1.5.4);
- Q2 (2.1.3; 2.1.4; 2.2.1; 2.2.2; 2.3.3; 2.3.4);
- Q3 (3.1.4; 3.1.6; 3.1.7; 3.2.2; 3.3.2; 3.3.3); and
- Q4 (4.1.3; 4.2.2; 4.3.1; 4.3.2; 4.3.3; 4.3.4; 4.4.1; 4.4.2; 4.4.3).

- (b) The majority of the candidates are English additional language speakers and hence experienced difficulty in interpreting some of the questions. They were unable to ascertain the usefulness, degree of bias and degree of fairness of source material. They also struggled to compare evidence, make judgements (justified or unjustified) or interpret and analyse sources.
- (c) Candidates gave one response when the question required two, especially when the mark allocation was (2 x 2) and the question required the candidate to compare two sources.
- (d) They also displayed a limited understanding of the key historical concepts such as Cold War, Marxism, and amnesty. This seems to be a recurring challenge. They lack the knowledge to explain key concepts within a theme;
- (e) Candidates displayed poor content knowledge, especially of theme 2 (Angola).
- (f) Exposure to examination-type questions appears to have been limited.
- (g) There was evidence of a lack of reading, writing and language skills, especially among FAL learners.

### **Common errors and misconceptions regarding paragraph-type questions**

- (a) Many candidates performed poorly on the following paragraph-type questions:
  - Q1.6;
  - Q2.4;
  - Q3.4; and
  - Q4.5.
- (b) Many candidates were unable to construct reasonable paragraphs for the following reasons:
  - inability to write a coherent paragraph;
  - inability to use own knowledge to write an organised paragraph in response to the question posed and substantiate responses with suitable evidence;
  - inability to interpret, analyse and integrate the information from the source to write a coherent and logical paragraph;
  - inability to synthesise the given information as reflected in their copying of the information directly from the sources provided;
  - being constrained by the number of words required to write a focused paragraph (80 words/8 lines); and
  - poor language and writing skills.
- (c) Many lacked the requisite content knowledge to answer the question posed, for example in Q1.6. Most candidates did not write on the effects that Gorbachev's policies had on both the National Party and the ANC. In Q3.4 they were unable to explain the significance of both the Groote Schuur and the Pretoria Minute for the process of negotiation. This shows that candidates lacked the necessary paragraph-writing skills and were also not exposed to the prescribed analytic rubric that was used in the assessment of paragraphs.

### Common errors and misconceptions regarding extended writing (level 1) questions

- (a) Many candidates performed poorly in answering extended writing questions:
- Q1.7.1;
  - Q2.5.1;
  - Q3.5.1; and
  - Q4.6.1.
- (b) Many candidates were unable to write logical essays because of an inability to provide an argument; and, in some cases, to have a clear introduction and conclusion. For example, in answering Q4.6.1, most candidates focused exclusively on the success of the TRC rather than on both its successes and its failures and many did not provide relevant examples to support their answers.
- (c) Candidates were unable to demonstrate their ability to understand, e.g. Q2.5.1, and lacked the necessary content knowledge to discuss to what extent Angola was able to re-imagine itself. Also in terms of Q4.6.1, most candidates mainly focused on the attempt of the TRC to heal the divisions within South Africa.
- (d) Candidates provided vague and disjointed responses in certain cases.

### Common errors and misconceptions regarding extended writing (level 2) questions

- (a) Many candidates performed poorly on extended writing questions:
- Q1.7.2;
  - Q2.5.2;
  - Q3.5.2; and
  - Q4.6.2
- (b) Many candidates were unable to write this type of essay, which required the use of evidence from the sources and own knowledge. The following are some of the errors:
- failure to focus on the topic;
  - lack of an introduction and a conclusion;
  - poor or no historical knowledge of the topic, evident in Q1.7.2; Q2.6.2, Q3.6.2 and Q4.6.2, in which most candidates showed very little or no understanding of how to write/construct an essay using the information from the sources and their own knowledge;
  - in many cases, no effort to use evidence from the sources to answer the question;
  - some completely irrelevant responses that obtained a failure mark;
  - direct copying from the sources without acknowledgement;
  - very little evidence of interpretation, analysis and the ability to construct an original argument, for example in Q2.5.2; and Q4.6.2; and
  - there has been a lack of exposure to essay-type questions.

## Suggestions for improvement

- Teachers need to ensure that they follow the National Examination Guidelines during the teaching and assessment of the sections prescribed. The Examination Guidelines are designed to provide clarity on the scope and depth of the concepts that need to be taught, learned and assessed. Learners need to be taught examination techniques.
- Necessary and essential skills on how to work with sources such as interpretation, analysis, usefulness, comparison and how to integrate information from the sources and own knowledge are essential. In preparation for CAPS in 2014, educators are requested to visit the DBE website. This website has useful information on 'Working with Sources'.
- Teachers and learners should not rely on one textbook only, and they should be alert to new resource materials such as media articles or newspaper supplements. Radio or TV features can also be used productively.
- Techniques on how to construct a coherent, well-planned and structured paragraph and essay need serious attention. To this end, educators are encouraged to use writing frames. More exposure to the TRC is needed, especially on how to work with sources and the use of case studies. It is advisable for educators to visit the SAHO website which highlights the workings of the TRC using case studies.
- It is necessary to have a thorough knowledge of the content focus areas. The planning, preparation and teaching of History must be rigorous. An Examination Guideline Document (CAPS) will be available in 2014.
- In the teaching of History, learners should be exposed to a variety of sources and the related source-based skills such as reading, interpreting, analysing, evaluating, comparing/contrasting and ascertaining the limitations, usefulness and justification of such sources. Learners should be taught the relevant themes, using interactive/user-friendly teaching methodology and the relevant notes.
- Greater emphasis should be placed on the teaching of paragraph and essay writing skills. In this respect the use of writing frames will assist. Learners should be taught how to answer the question posed, with an appropriate introduction, a body of historical knowledge and a relevant conclusion.
- User friendly resource materials should be developed and used, especially for the new content areas (Angola) and case studies on the TRC. In CAPS next year, Angola will be examined as a source-based question and the essay question is a comparative Case Study on Congo and Tanzania.
- Assessment, both informal and formal, should be ongoing and must assess historical skills such as interpretation, analysis, evaluation and synthesis of evidence from the given sources. It is also advisable for the educator to go beyond the Programme of Assessment and give more assessment tasks.
- A detailed analysis of learners' results should be undertaken by teachers to identify common areas of concern/weakness. This should be done immediately after an assessment is given. After this is done, appropriate remediation measures should be put in place to assist learners to develop the skills necessary for historical analysis.
- Past examination question papers should be made available and learners should be required to work with them. This would assist in refining examiners' questioning techniques.
- There should be interaction with the latest resource materials and teaching trends in History (listening to matric radio programmes, newspaper supplements, etc).

- Schools that have produced outstanding results should network with those which have difficulties, i.e. twinning of schools. Under-performing schools should be regularly visited by the curriculum advisers so as to give support and assist development.
- Adequate support should be given to teachers in the form seminars; workshops and presentations, especially on challenging contents, and regular monitoring should take place.
- Reference to past question papers to benchmark the setting of questions for tests and classwork should be encouraged. Cluster groups should practise the setting of test and examination question papers and have them moderated by curriculum advisers to ensure standardisation.
- Teachers must cover the whole syllabus. Refer to the Examination Guideline Document. More practice in working with difficult content is required.
- Common controlled tests would lead to an improvement in the quality of teaching, learning and assessment.
- There should be rigorous monitoring of the History SBA programme with a view to improving quality assurance at all levels of the system.
- Regular assignments, homework and tests will motivate learners. Regular and immediate feedback to learners will assist.
- Teachers need more training in the use of the matrix and the rubric.
- Teachers need ongoing professional support (workshops) on how to work with different types of sources and how to write coherent essays. Comprehensive source/resource booklets should be developed and be made available to both educators and candidates. Workshops and focused cluster meetings on curriculum and assessment matters should be considered as these will be very valuable;
- Educators need continued professional support and guidance on new content areas, such as themes 1 and 2. History educators should be encouraged to further their studies, i.e. they should obtain a major in History.
- Teachers need to teach in the medium of English, as learners are required to write the examination paper in English and they require adequate practice in the language of assessment.
- Teachers and learners should work with past exam question papers so that they can acquire the necessary practice with source based and essay questions from these question papers.
- Teachers should be encouraged to network with the curriculum advisors and other experts in the field of History.
- Subject advisors should encourage team teaching within and between clusters and districts and factor build in more regular on-site guidance and support during school visits.
- User-friendly resource materials should be developed and used, especially for the new content areas (Angola, Congo and Tanzania – see CAPS) and case studies on the TRC. Learner-support materials should ideally include self-study activities based on the format of typical examination-type questions, i.e. source-based (50) and essay questions (50) – see CAPS.
- Where possible, if textbooks are not available, subject advisors and subject experts should compile workbooks on new content areas. These workbooks should cater for all levels of learners.

## LIFE SCIENCES

The following report should be read in conjunction with the Life Sciences question papers of the November 2013 Examination.

### 9.1 PERFORMANCE TRENDS (2010 – 2013)

In Life Sciences, between 2012 and 2013, there was a 4.2 percentage point increase in the cohort of learners who achieved at 30% and above, and a 4.4 percentage point increase in the cohort of learners who achieved higher quality passes at 40% and above. Additionally, the number who passed Life Sciences increased by 28 649 - providing a boost to national human resource development pipeline requirements for science competencies and skills of Grade 12 graduates.

**Table 9.1.1 : Overall achievement rates in Life Sciences**

Year	No. Wrote	No. achieved at 30% and above	% achieved at 30% and above	No. achieved at 40% and above	% achieved at 40% and above
2010	285 496	212 895	74.6	147 518	51.7
2011	264 819	193 946	73.2	122 302	46.2
2012	278 412	193 593	69.5	120 734	43.4
2013	301 718	222 374	73.7	144 355	47.8

**Figure 9.1.1: Overall achievement rates in the Life Sciences**

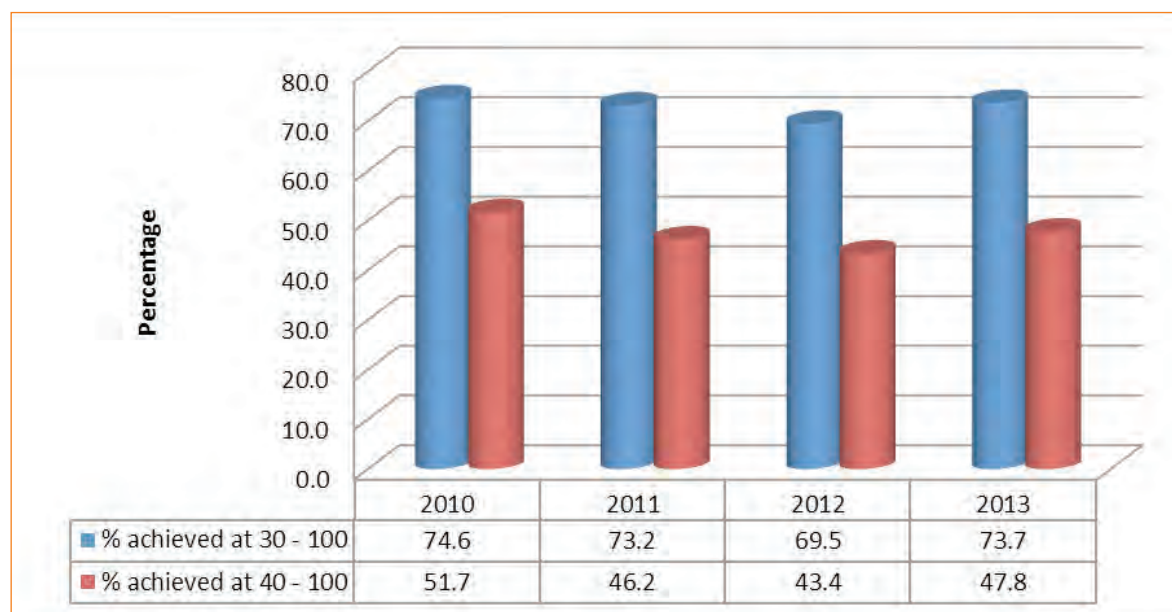
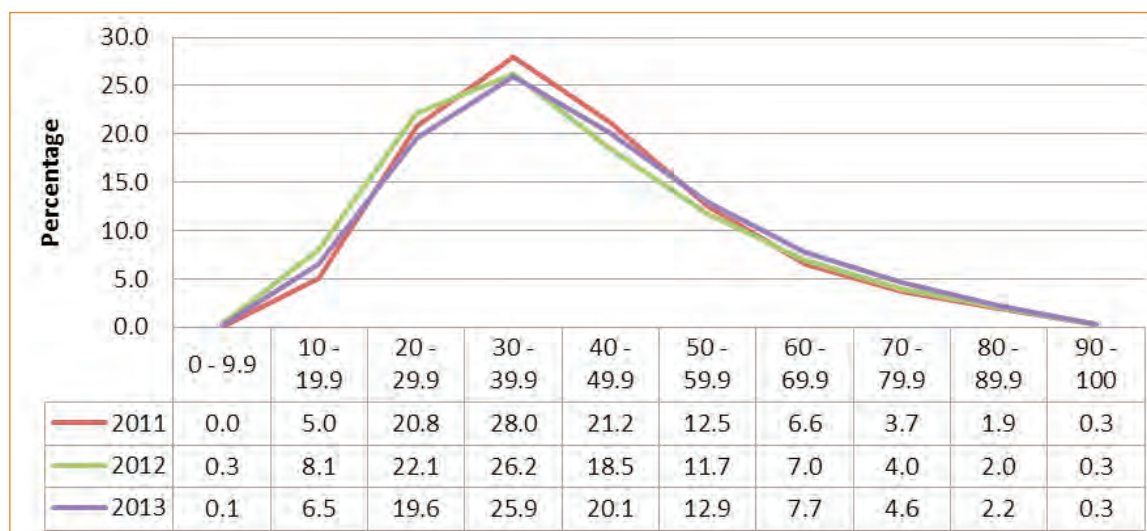


Figure 9.1.2: Performance Distribution Curves Life Sciences ( 2011 – 2013)



## 9.2 OVERVIEW OF LEARNER PERFORMANCE IN PAPER I

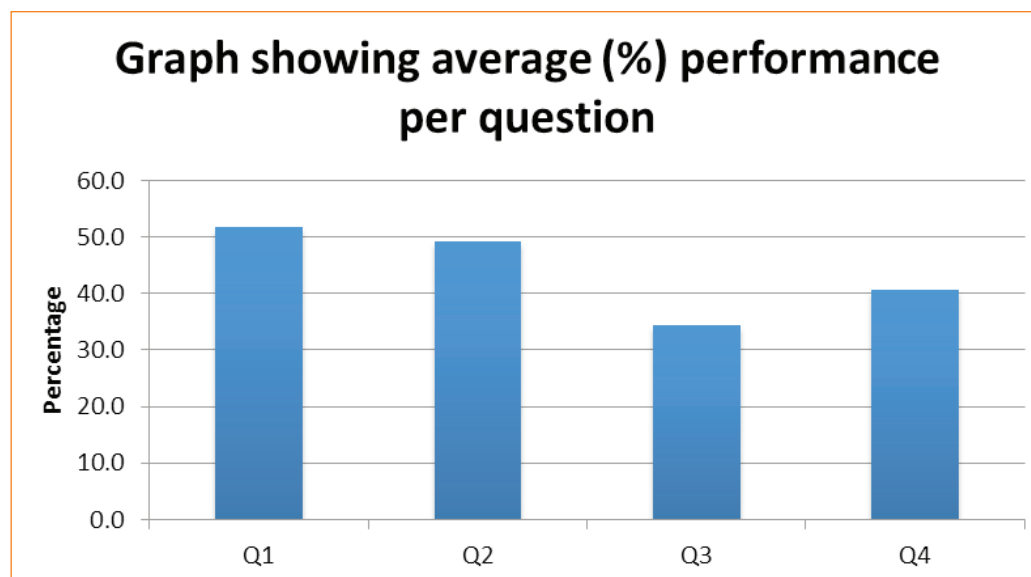
### General comments

- A positive trend was that a greater proportion of candidates attempted the essay question than in the preceding years.
- Graph drawing skills have improved. Some candidates, however, still lose marks for aspects such as scale, caption and the labelling of the axes.
- Many candidates were not familiar with basic terminology in the different topics. This resulted in poor performances, even in the lower-order questions.
- Candidates demonstrated very limited knowledge of concepts relating to meiosis, genetics and human evolution.
- Poor performance was recorded in questions based on scientific investigations.
- Many candidates demonstrated difficulty in interpreting the questions. They failed to give reasons when asked to do so, or they provided reasons that were not observable when observable reasons were asked for. Many also provided words for answers when letters were asked for and vice versa.

### 9.3 DIAGNOSTIC QUESTION ANALYSIS FOR PAPER I

A sample of scripts from each province revealed the following average performance on each question.

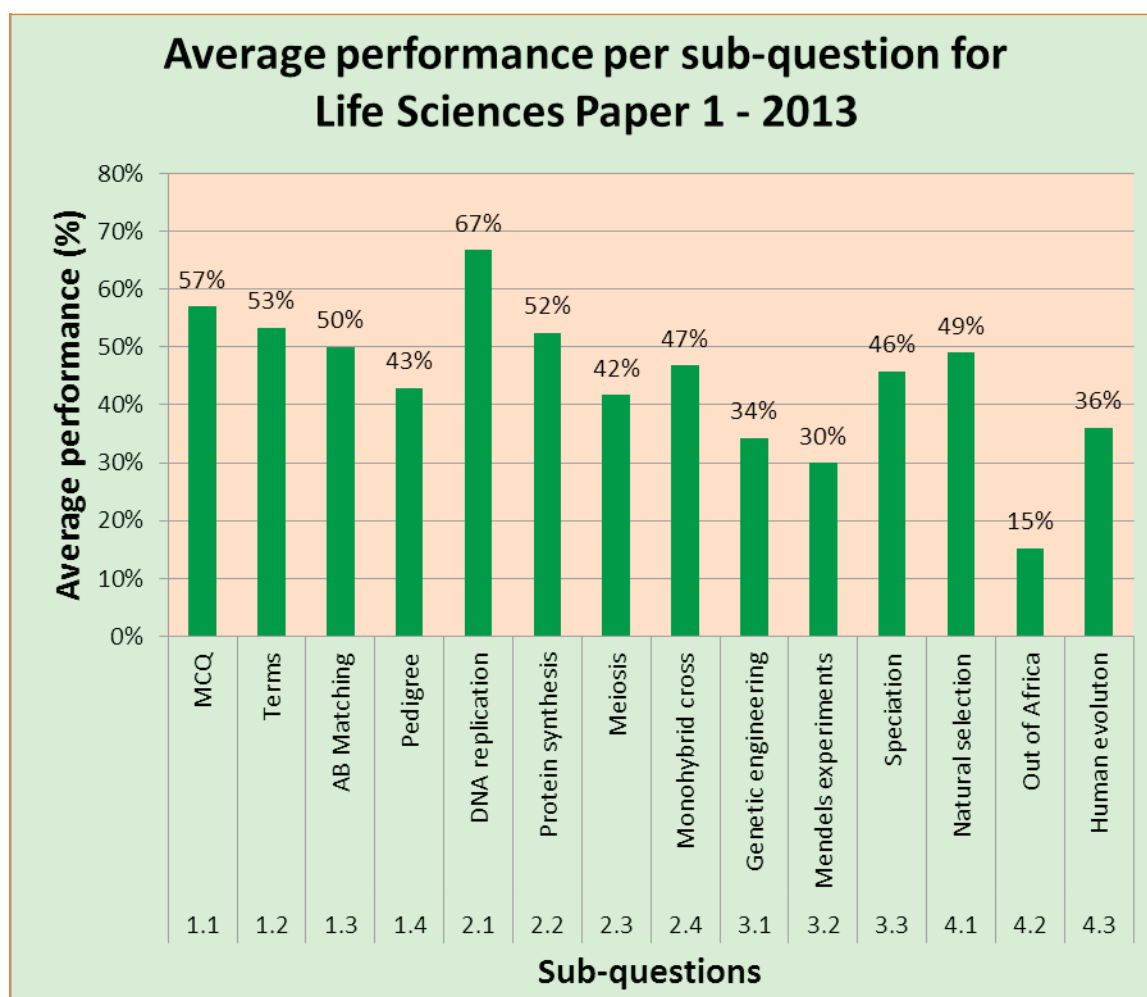
Figure 9.3.1 : Average performance per question in Life Sciences Paper 1



Question	Type of question	Average Performance (%)
Q1	Multiple choice, terminology, matching and pedigree diagram	51.8
Q2	DNA replication, protein synthesis, meiosis and monohybrid cross	49.2
Q3	Genetic engineering, Mendel's experiments and speciation	34.5
Q4	Natural selection, 'Out of Africa' hypothesis and human evolution	40.6



Figure 9.3.2: Average performance per sub-question in Paper 1



## 9.4 ANALYSIS OF LEARNER PERFORMANCE IN INDIVIDUAL QUESTIONS IN PAPER I

### QUESTION ONE: Multiple Choice, Matching, Terminology and Pedigree Diagram

#### Common errors and misconceptions

- Performance in Q1.1-1.3 showed that candidates lacked basic knowledge of terminology. They confused similar terms such as population and species; transcription and translation; codon and anticodon; homozygous and heterozygous; selective breeding and cloning; polyploidy and Down syndrome; genotype and genome; chromosomes and chromatids; multiple alleles and polygenic inheritance; and, sympatric and allopatric speciation.
- Examples of the concepts tested in Q1.2 were provided rather than the comprehensive term for the concept. For example, in Q1.2.2, triploidy and tetraploidy, which are specific examples of polyploidy, were given rather than polyploidy itself.
- Candidates experienced difficulty in interpreting the pedigree diagram in Q1.4. Genetic disorders are more commonly caused by recessive alleles. Candidates assumed this to be the case for this question despite the stem of the question stating that the particular genetic disorder was caused by a dominant allele. Furthermore, many candidates treated this as a pedigree involving a sex-linked disorder when this was not stated in the question. They therefore provided the alleles incorrectly in Q1.4.1 as superscripts such as  $X^R X^r$  instead of Rr.

## Suggestions for improvement

- (a) Greater emphasis should be placed on the learning of appropriate terminology related to the various topics, together with the correct spelling of these terms. Refer to the strategies for teaching and learning terminology provided on page 107 of the 2012 Diagnostic Report on Learner Performance.
- (b) Learners should have adequate opportunities to differentiate between closely related terms.
- (c) Learners should be guided in accessing relevant information provided in a question that will aid in the formulation of a correct response. If a disorder is sex-linked for example, some information in this regard will be provided in the question.
- (d) Teachers should guide learners in interpreting the requirement/s of different questions: they should ask themselves whether the question requires, as an answer, a letter only, a name only or both a letter and a name.
- (e) There are certain steps that can be followed to successfully interpret a pedigree diagram. Please refer to these steps which were listed in detail on pages 109-110 of the 2012 Diagnostic Report on Learner Performance.

## QUESTION TWO: DNA Replication, Protein Synthesis, Meiosis and

### Monohybrid Cross

#### Common errors and misconceptions

- (a) In Q 2.1.2, many candidates provided responses about *where* replication occurs rather than on *when* it occurred.
- (b) In Q 2.2.3, many candidates showed a poor understanding of the process of protein synthesis and were not able to make conversions from a DNA base triplet to an mRNA codon to a tRNA anticodon and eventually to a particular amino acid.
- (c) In Q2.3.3, marks were lost since many candidates provided an explanation for diagram X without continuing with an explanation for Diagram Y. The question required a comparison of the two diagrams.
- (d) In Q2.3.4(a), many candidates were not able to recognise non-disjunction as the reason for the absence of chromosomes in nuclei O and P.
- (e) Many candidates did not make use of the information provided in the opening statement of Q2.3 referring to chromosome pair 21. As a result, they were not able to use this information to lead them to the correct disorder (Down syndrome) required in Q 2.3.4(b). They were also unable to provide a full account leading from the empty nuclei to the occurrence of Down syndrome.
- (f) In Q2.4, candidates failed to identify the monohybrid cross as involving the second generation. As a result, they used the notation  $P_1$  and  $F_1$  in the genetic format instead of  $P_2$  and  $F_2$ . In addition, many candidates provided a genetic cross involving the first generation when only the second generation was required.

## Suggestions for improvement

- (a) Teachers should introduce the cell cycle in order to adequately describe when DNA replication occurs. DNA replication takes place before mitosis or meiosis during interphase. Interphase is not the first phase of mitosis or meiosis but rather occurs before mitosis or meiosis.

- (b) Subject advisors should ensure that teachers are aware that the names of the phases of meiosis are required by the CAPS from 2014.
- (c) Learners require multiple exposure to questions on protein synthesis. There should be opportunities to work forward from DNA base triplets to mRNA codons to tRNA codons and finally to the appropriate amino acids, as well as backwards from amino acids to the DNA base triplets.

The relationship between DNA, mRNA and tRNA in protein synthesis can be strengthened by teaching the conversion of codes for protein synthesis carried by these three molecules as follows:

Learners can be asked to provide the missing base sequence (code) in the spaces provided.

Molecule	Example 1	Example 2	Example 3
DNA base triplet	ACG		
mRNA codon		UAC	
tRNA anti-codon			GUA

When interpreting a given table of amino acids, it is important to check if the amino acids are linked to the DNA base triplet, the mRNA codon or the tRNA anti-codon. In Q2.2.3, it was linked to the DNA base triplet.

- (d) The format required in solving genetics problems needs emphasis. Two out of six marks are awarded for the format alone. Please refer to the format presented on pages 108-109 in the 2012 Diagnostic Report on Learner Performance.
- (e) Teachers should provide more exposure to learners in the solving of genetics problems involving more than one generation and in identifying which generation the question requires to be represented. This should be linked to the appropriate notation required in representing a genetic cross involving that generation.
- (f) Subject advisors should ensure that teachers are confident in teaching the solving of monohybrid genetics problems as well as prepare them adequately in the solving of dihybrid genetics problems required by the CAPS from 2014.
- (g) Beyond a description of the events of meiosis, learners need exposure to questions requiring higher order thinking. This will allow them to interpret illustrations representing non-disjunction or the effects of non-disjunction.
- (h) Teachers should account for the occurrence of Down syndrome using a clear cause-effect sequence as follows:
- Due to non-disjunction ✓ during meiosis;
  - the chromosome pair 21 does not separate. ✓ ;
  - The resulting ovum may therefore have TWO copies of chromosome number 21. ✓ ;
  - If this ovum fuses with a normal sperm having ONE copy of chromosome 21 ✓ ;
  - the resulting zygote will have 3 copies ✓ of chromosome number 21; and
  - leading to a child with Down syndrome. ✓

- (i) Teachers should guide learners in interpreting questions by using past examination question papers. In addition, learners should understand what is required by the different action verbs (such as 'state', 'describe', 'explain' and 'compare') used in questions.

### **QUESTION THREE: Genetic Engineering, Mendel's Experiments and Speciation**

#### **Common errors and misconceptions**

- (a) Candidates confused the following terms: genome, genotype and karyotype; genetic engineering and selective breeding; genes and alleles; and, species and population.
- (b) In Q 3.1.4, many candidates were not able to explain the value of growing herbicide-resistant crops. In many cases this was confused with pest resistance.
- (c) In Q 3.1.5, general advantages of genetic engineering were provided rather than in crop production.
- (d) In Q3.2.2, many candidates were not able to calculate the ratio required. Where they were calculated, the answers were not provided to two decimal places like the rest of the ratios in the table provided.
- (e) Answers to Q 3.2.5 showed that many candidates are not able to clearly differentiate amongst the three types of variables: a controlled/fixed variable; a dependent variable and an independent variable.
- (f) In Q3.2.6, Mendel's law of dominance was stated instead of Mendel's law of segregation.
- (g) In Q3.3, many candidates provided a description of speciation that was not arranged in a logical sequence or provided incomplete accounts on speciation.

#### **Suggestions for improvement**

- (a) Learners should be taught to round up to 2 decimal places. Teachers should also explain what is meant by ratio, how to calculate it, and that there is a difference between expressing a ratio of 1:3 as opposed to a ratio of 3:1.
- (b) Teachers should explain the work of Mendel to learners before doing genetic crosses.
- (c) Learners should have greater exposure to questions based on information extracted from scientific magazines and journals as these will better prepare them to answer questions based on scientific investigations as well as on the application of science to everyday life. Learners tend to focus on scientific concepts without an understanding of how these concepts arose or how they are relevant to our lives.
- (d) Teachers should offer more opportunities to learners for the writing of answers in paragraph form. The logical sequence of an account is best obtained through a good understanding of the cause-effect sequence. This would allow learners to write better accounts of various processes such as speciation, natural selection, negative feedback mechanisms and accommodation.
- (e) Teachers should clearly explain that Mendel's law of dominance relates to dominant and recessive alleles, whereas Mendel's law of segregation relates to the separation of each allele pair such that each gamete only contains one allele for a particular gene.
- (f) Teachers should clearly differentiate amongst the three types of variables as follows:

Controlled/fixed variable – refers to the factors that should be kept constant so that the results of an investigation can be considered valid.

Independent variable – refers to the factor that is being investigated. This factor is usually manipulated by the investigator either at the start of the investigation or during the course of the investigation. The independent variable appears on the X axis of a graph.

Dependent variable – refers to the effect of the independent variable. This effect is usually measured in some way and appears on the Y axis of a graph.

#### **QUESTION FOUR: Natural Selection, 'Out Of Africa' hypothesis and Human Evolution**

##### **Common errors and misconceptions**

- (a) In Q 4.1.1, although graph-drawing skills have improved, the following aspects still require attention:
- determining the axis to use for the dependent and independent variables;
  - use of an appropriate scale; and
  - formulation of a caption that includes both the independent and dependent variables.
- (b) In Q4.1.2 - 4.1.3, candidates were unable to identify that there were TWO dependent variables and TWO independent variables in the investigation.
- (c) In Q 4.1.4, although candidates were able to display some understanding of natural selection they often lost marks since:
- they provided a general account on natural selection without relating it to copper-tolerance;
  - they provided accounts that were not arranged in a logical sequence; and
  - they provided incomplete accounts.
- (d) In Q4.2, many candidates were unable to describe how a study of the Y-chromosome provides evidence for the "Out of Africa" hypothesis. Subject advisors should bring to the attention of their teachers that only the role of mitochondrial DNA as genetic evidence for the 'Out of Africa' hypothesis is required by the CAPS from 2014.
- (e) In the essay in Q4.3, candidates were not credited/lost marks when they:
- included information on the structural changes to the pelvic girdle, spine and foot whereas the question asked for structural changes to the skull only;
  - included information on all human ancestors whereas the question required a comparison of modern humans and their ape-like ancestors only;
  - included information on the structural changes without stating the significance of these changes; and
  - used the terms skull, cranium and brain interchangeably.

##### **Suggestions for improvement**

- (a) Learners should be given adequate opportunities to practice graphing skills for all types of graphs as a part of the daily assessment programme.

- (b) Learners should be given the assessment criteria for different types of graphs so that they will be aware of how marks are distributed for the various sub-skills: caption; scale; titles of the X- and Y-axes, including units; plotting and joining of points.
- (c) Questions based on the scientific method from past examination papers should form part of the daily assessment tasks given to the learner. The skills generally associated with this are the following:
- Formulating a hypothesis;
  - Identifying dependent and independent variables;
  - Listing variables that should be controlled;
  - Analysing the results of an investigation and applications thereof;
  - Drawing conclusions;
  - Listing ways of improving the reliability of the investigation; and
  - Listing ways of improving the validity of the investigation.

A greater emphasis on practical work and practical exams of good quality in grades 10 and 11 will also assist in preparing learners more adequately for questions based on scientific investigations. This is especially important since knowledge of scientific investigations is assessed in paper 1 and paper 2.

- (d) Learners should have sufficient opportunities, through the medium of daily assessment tasks, to apply certain concepts such as natural selection by using higher-order questions from past examination papers.
- (e) Teachers should use examples of the current and past essay questions to deliberately teach learners the skill of interpreting the question to determine what is required. Keywords in the question should be underlined. In the essay in Q4.3, this would have helped to identify that the focus was the *skull* and not other parts of the skeleton. It would also have drawn attention to the need to state the *significance* of each part mentioned.
- (f) Subject advisors should inform teachers that the format of the papers for CAPS from 2014 is different from the current examination papers. Section C of the examination paper will consist of the essay only. Teachers should expose learners to the Grade 12 exemplar papers so that they will be familiar with the new format.
- (g) Subject advisors should inform teachers that the criteria for assessing the presentation of the essay(synthesis) have changed. Marks are now allocated for relevance, logical sequence and comprehensiveness as follows:

Criterion	Relevance (R)	Logical sequence (L)	Comprehensive (C)
<b>Generally</b>	All information provided is relevant to the topic	Ideas are arranged in a logical/cause-effect sequence	All aspects required by the essay have been sufficiently addressed
<b>In this essay in Q4.3</b>	Only information relevant to the <i>structural changes in the skull</i> or <i>significance of these changes</i> is given (there is no irrelevant information)	Generally each significance is appropriately linked to the relevant structural change to the skull	At least 3 structural changes described together with the significance of each
<b>Mark</b>	1	1	1

## 9.5 OVERVIEW OF LEARNER PERFORMANCE IN PAPER 2

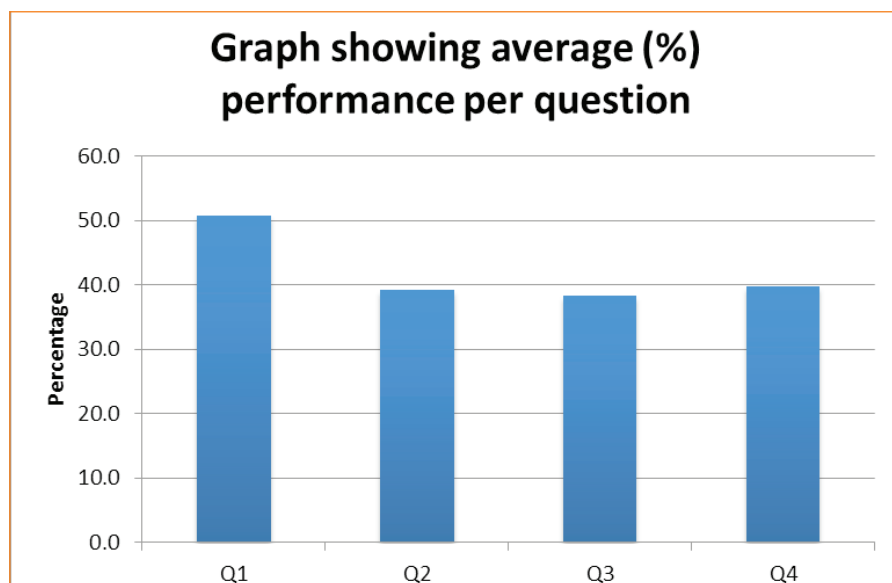
### General comments

- (a) A positive trend was that a greater proportion of candidates attempted the essay question than in previous years.
- (b) Graph-drawing skills have improved. Some candidates still lost marks, however, for aspects such as scale, caption and the labelling of the axes.
- (c) Many candidates were not familiar with basic terminology in the different topics. This resulted in poor performance even in the lower-order questions.
- (d) Candidates demonstrated very limited knowledge of concepts relating to environmental studies.
- (e) Poor performance was recorded in questions on scientific investigations based on plant hormones and on nervous co-ordination.
- (f) Many candidates demonstrated difficulty in interpreting the questions. They failed to give reasons when asked to do so, or they provided reasons that were not observable when observable reasons were asked for. Many also provided words for answers when letters were asked for and vice versa.

## 9.6 DIAGNOSTIC QUESTION ANALYSIS FOR PAPER 2

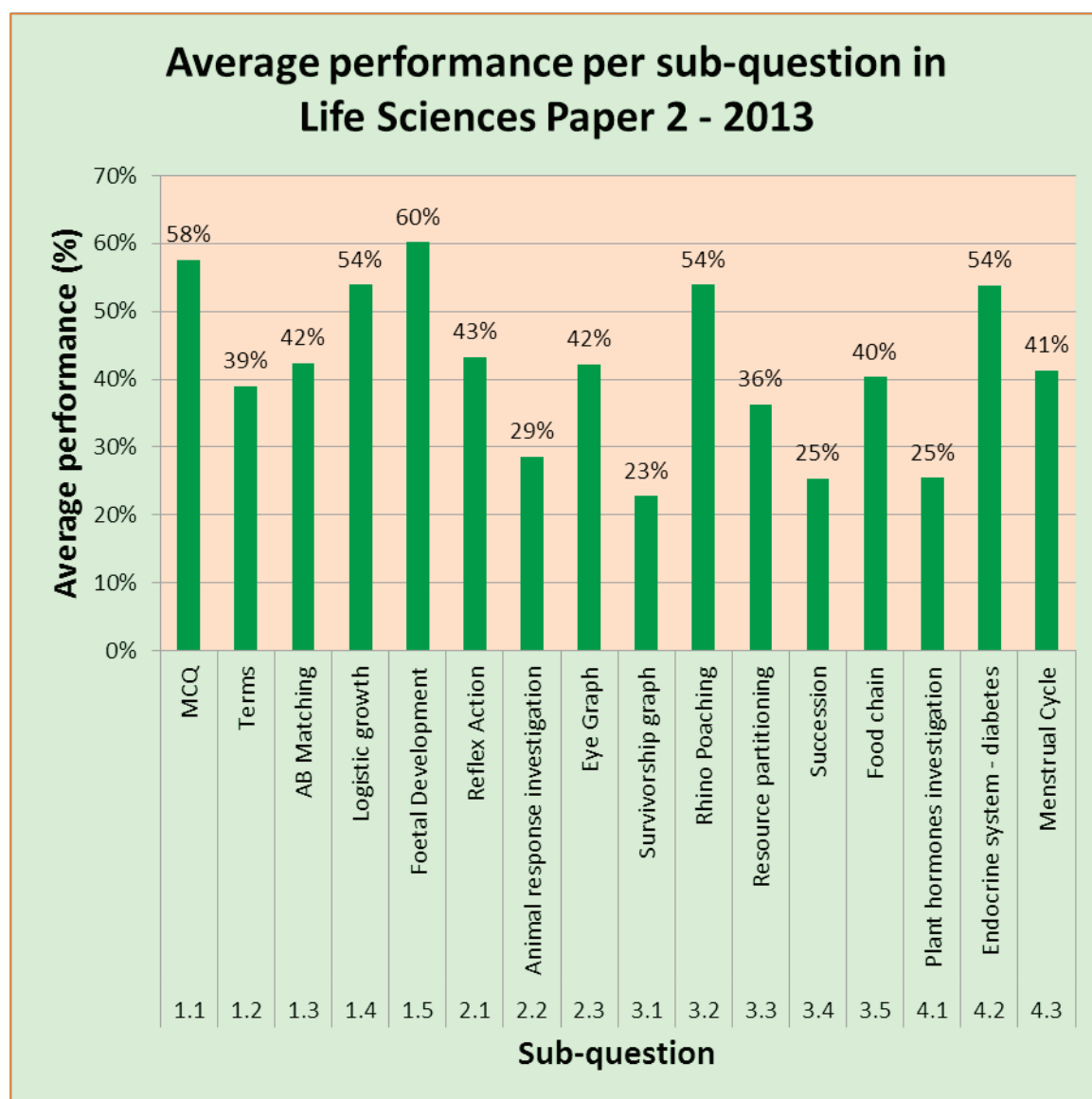
A sample of scripts from each province revealed the following average performance on each question.

**Figure 9.6.1: Average performance per question in Life Sciences Paper 2**



Question	Type of question	Average Performance (%)
Q1	Multiple choice, terminology, matching, logistic growth and foetal development	50.8
Q2	Reflex action, animal response investigation and the eye	39.2
Q3	Human population, rhino poaching, resource partitioning, succession and food chains	38.3
Q4	Plant hormones, endocrine system and the menstrual cycle	39.8

Figure 9.6.2 : Average performance per sub-question in Life Sciences Paper 2



## 9.7 ANALYSIS OF LEARNER PERFORMANCE IN INDIVIDUAL QUESTIONS

### QUESTION ONE: Multiple Choice, Matching, Terminology, Logistic Growth and Foetal Development

#### Common errors and misconceptions

- As in Paper 1, performance in Q1.1-1.3 showed that candidates lacked basic knowledge of terminology. They confused similar terms such as ovule, ovary and ovum; style and pistil; environmental resistance and carrying capacity; validity and reliability; dependent and independent variable.
- In Q1.4-1.5, many candidates were not able to identify the appropriate phase in the logistic growth form or the appropriate structure in the developing foetus.
- In Q 1.5, candidates lost marks since they provided words as answers when letters were asked for.



## Suggestions for improvement

- (a) Teachers should place greater emphasis on the learning of appropriate terminology related to the various topics, together with the correct spelling of these terms. Refer to the strategies for teaching and learning terminology provided in page 107 of the 2012 Diagnostic Report on Learner Performance.
- (b) Learners should be guided in interpreting the requirement/s of different questions: they should ask themselves whether the question requires, as an answer, a letter only, a name only or both a letter and a name.
- (c) It is difficult to understand or describe a process if one does not know the names and functions of the relevant parts involved in the process. Learners can practice this skill by providing labels and functions of labelled parts using un-labelled diagrams (such as those provided in the Life Sciences *Mind the Gap* study guide of 2012 – pages 94 to 115).

## QUESTION TWO: Reflex action, Animal response investigation and the Eye.

### Common errors and misconceptions

- (a) In Q2.1, many candidates lost marks because:
  - their drawings could not be recognised as a neuron;
  - they did not recognise part B as a motor neuron and therefore made drawings of the sensory neuron instead;
  - they did not provide a caption for their drawing;
  - they did not have sufficient correct labels; and
  - they did not have the compulsory labels that are stated in the 2011 Exam Guideline document.
- (b) In Q2.1.2, candidates lost marks because they confused effectors with receptors.
- (c) In Q2.1.3, many candidates provided the name of a stimulus as an answer without providing an appropriate response to the stimulus. For example, the answer 'heat' or 'flame' was not accepted, but the answer 'pulling your hand away from the flame' was accepted. Since the question asked for an example of a reflex action, the appropriate action in response to the stimulus had to be stated.
- (d) In Q2.2, candidates performed poorly on questions relating to the scientific investigation. The poor performance could be due to a lack of exposure to practical work in grades 10-12.

Candidates lost marks because they were unable to:

- list steps involved in planning an investigation;
- differentiate between a dependent and an independent variable; and
- identify factors that had to be kept constant during the investigation.

In many cases, candidates provided incomplete answers in naming the variables. For example, they stated '*woodlice*' as the dependent variable rather than the '*number of woodlice*'.

In addition to the above, candidates provided examples of conditions (dry and moist conditions) rather than providing a comprehensive term for the set of conditions that constitute the independent variable such as 'the amount of moisture'.

Incomplete answers were also evidenced in the listing of the factors that had to be kept constant. For example, candidates indicated that the filter paper had to be kept constant without indicating what characteristic was being referred to such as 'same size of filter paper' or 'same thickness of filter paper'.

- (e) In Q2.3, many candidates failed to interpret the graph showing the functioning of the eye, probably because teachers only focus on lower-order questions involving recall and comprehension, without exposing learners to higher-order questions in the topic.

### **Suggestions for improvement**

- (a) Teachers should provide more opportunities for learners to practise the drawing of simple diagrams. The various techniques involved in producing a good drawing should be emphasised such as neat line-work, size and proportion, labelling techniques and providing an appropriate caption.
- (b) The Examination Guideline should be consulted when lessons are being planned. This document specifies the parts of the neuron that play a direct role in the transmission of impulses and which should be studied.
- (c) Differentiate between receptors and effectors as follows:

Receptors are structures that receive the stimulus and convert it into an impulse which is then transmitted by the sensory neuron to the brain or spinal cord.

Effectors are structures that respond to the stimulus after receiving an impulse from a motor neuron coming from the brain or spinal cord.

- (d) Questions based on the scientific method from past examination papers should form a part of the daily assessment tasks given to learners. The skills generally associated with this are as follows:

- Formulating a hypothesis;
- Identifying dependent and independent variables;
- Listing variables that should be controlled;
- Analysing the results of an investigation and applications thereof;
- Drawing conclusions;
- Listing ways of improving the reliability of the investigation; and
- Listing ways of improving the validity of the investigation

- (e) Teachers should provide sufficient opportunities for learners, through the medium of daily assessment tasks, to apply all concepts taught by using higher-order questions from past examination papers. It should not be expected that a topic will always be assessed in the same way.

## QUESTION THREE: Logistic growth form, Rhino poaching, Resource partitioning, Succession and Food chains

### Common errors and misconceptions

- (a) In Q3.1.2, many candidates lost marks because they:
- were unable to recognise the survivorship curves as alternate representations of age-gender graphs;
  - did not know what characterised a developed and a developing country; and
  - provided a *description* of the patterns shown by the two survivorship curves rather than an *explanation* of how the pattern in each curve was aligned to the characteristics of a developed or a developing country.
- (b) In Q3.2.1, candidates provided a definition of culling rather than poaching.
- (c) In Q3.2.4 - 3.2.5 candidates lost marks because they provided incomplete answers. In Q3.2.4 for example, candidates spoke of 'rhinos becoming extinct' without elaborating on the impact of them becoming extinct such as 'thus reducing biodiversity'. They *listed* the consequences of increasing rhino poaching rather than *explaining* the impact of the consequences.
- (d) Generally questions on environmental studies (Q3.1, 3.3, 3.4 and 3.5) were poorly answered giving the impression that this topic, which is scheduled towards the end of the year, was neglected by both teachers and learners.
- (e) In Q3.3, candidates lost marks because they confused the following pairs of terms: resource partitioning and competitive exclusion; interspecific competition and intraspecific competition. This once again indicates that insufficient attention is given to the teaching and learning of terminology.
- (f) In Q3.4, it was clear that candidates lacked knowledge of succession and the role that pioneer plants play in succession.
- (g) In Q3.5, many candidates were unaware that they were being assessed on their knowledge of imbalance in a food chain and therefore made no mention of the series of events involved in the disruption of the food chain.

### Suggestions for improvement

- (a) Teachers should guide learners in interpreting questions by using past examination papers. In addition, learners should understand what is required by the different action verbs (such as 'state', 'describe' and 'explain') used in questions.
- (b) Teachers should emphasise that to *explain* a disadvantage, such as in Q3.5.3, means to say *what the disadvantage is* and then say *why it is a disadvantage*.
- (c) Teachers should emphasise the main characteristics that help differentiate between a developed country and a developing country such as:
- In a developed country the birth rate is low, whereas life expectancy is high.
  - In a developing country the birth rate is high, whereas life expectancy is low.
- (d) Teachers should organise their work schedules in such a way that adequate time is allocated for the teaching of all topics. In this way topics scheduled for the end of the year do not become neglected. In CAPS from 2014, time should be allocated for revision of the topic 'Human Impact on the Environment' which is taught in grade 11

but assessed in both grades 11 and 12.

- (d) Since the lack of knowledge of basic terminology contributed to poor performance in many of the sub-questions in Q4, it is important that teachers once again refer to strategies for the teaching and learning of terminology provided in page 107 of the 2012 Diagnostic Report on Learner Performance.

#### **QUESTION FOUR: Plant hormones, Endocrine system and the Menstrual Cycle**

##### **Common errors and misconceptions**

- (a) In Q4.1.1 learners lost marks because they:
- gave the general functions of gibberellins instead of providing the function related to the information in the graph;
  - described what was observed in the graph for gibberellins rather than providing its function; and
  - confused the functions of gibberellins with the functions of auxins.
- (b) In Q4.1.2, many candidates lost marks because they:
- stated the length of the lateral branches without the units. One mark is allocated for the value and another mark for the correct unit; and
  - misread the key and therefore used incorrect values from the graph in their calculation, leading to a wrong answer.
- (c) In Q4.1.3, candidates' responses with regard to improving reliability have improved from that of the 2012 examination. There are however, some candidates who still confuse reliability with validity.
- (d) In Q4.1.4, candidates lost marks because they:
- made reference to the role of auxins in phototropism rather than apical dominance; and,
  - referred to apical dominance without referring to the reason for the difference in concentration of auxins through the period of the investigation.
- (e) In Q4.2.1, there was an improvement in the drawing of the graph, but many candidates still lost marks since they:
- did not include both variables in the caption;
  - transposed the axes;
  - drew a bar graph instead of a histogram;
  - did not include units in the X-axis and Y-axis labels; and
  - did not draw the bars of the same width.

- (f) In Q4.2.2 - 4.2.4, candidates performed poorly as they seemed to have lacked knowledge about the endocrine glands, the hormones they produce and the functions of each hormone. Candidates also confused glycogen (a storage form of carbohydrate) with glucagon (the hormone that increases blood glucose level by converting glycogen to glucose).
- (g) Although more candidates attempted the essay than in past years, many candidates lost marks/were not credited because they:
- stated the names of some parts/hormones that are involved in the menstrual cycle without stating the function of these parts/hormones;
  - included information that was not relevant to the menstrual cycle such as the role of prolactin and oxytocin;
  - did not arrange the different events of the menstrual cycle in a logical sequence; and
  - did not include the functions of all the hormones that control the menstrual cycle.

### **Suggestions for improvement**

- (a) Teachers should expose learners to more data-response questions as a part of the daily assessment programme. Through these questions, learners should be taught how to interpret information, and how to use the information provided to formulate appropriate responses to the questions. Many candidates ignored the information provided which contained important clues to arriving at the correct answer.
- (b) More tasks involving the drawing and interpreting of graphs should be used as a part of the daily assessment programme. In addition, teachers should clearly emphasise the difference between a histogram and a bar graph as follows:
- A histogram is used when there is continuous data such as the number of individuals in a population in each age group;
  - In the above example, age is continuous since there are people of all different ages from young to old;
  - Because age is continuous, there are no spaces between the bars in a histogram;
  - A bar graph is used when there is discontinuous data such as the percentage contribution of four different factors to pollution in the atmosphere;
  - In the above example the factors causing pollution represent discontinuous data since the different actors are not related to each other. They do not represent a range of the same characteristic; and
  - Because the factors affecting pollution is discontinuous, there are spaces of equal interval between the bars in a bar graph.
- (c) Learners should be given the assessment criteria for different types of graphs so that they will be aware of how marks are distributed for the various sub-skills: caption; scale; titles of the X- and Y-axes; including units; drawing of bars.
- (d) Teachers should make further attempts to guide learners in differentiating between reliability and validity in scientific investigations. For a detailed description of validity and reliability, please refer to page 111 of the 2012 Diagnostic Report on Learner Performance.

- (e) Learners should be given sufficient practice in answering essay questions. Refer to the steps outlined for Paper 1 in the 2012 Diagnostic report on Learner Performance, as these will be useful in answering an essay question.
- (f) For learners to get a holistic understanding of the menstrual cycle, teachers should emphasise that it involves a description of the events that take place in the ovary (the ovarian cycle) as well as the events that occur in the uterus (uterine cycle).
- (g) Subject advisors should inform teachers that the criteria for assessing the presentation of the essay (synthesis) have changed. Marks are now allocated for relevance, logical sequence and comprehensiveness as follows:

Criterion	Relevance (R)	Logical sequence (L)	Comprehensive (C)
<b>Generally</b>	All information provided is relevant to the topic	Ideas are arranged in a logical/cause-effect sequence	All aspects required by the essay have been sufficiently addressed
<b>In this essay in Q4.3</b>	Only information relevant to the <i>menstrual cycle</i> or the <i>role of hormones of the menstrual cycle</i> is given. (There is no irrelevant information)	The events of the menstrual cycle are presented in the correct sequence and the hormones linked to the appropriate events	The roles of all 4 hormones in the menstrual cycle are mentioned
<b>Mark</b>	1	1	1

- (h) Subject advisors should inform teachers that the format of the papers for CAPS from 2014 is different from the current examination papers. Section C of the examination paper will consist of the essay only. Teachers should expose learners to the Grade 12 exemplar papers so that they will be familiar with the new format.

## MATHEMATICS

The following should be read in conjunction with the Mathematics question papers of November 2013

### 10.1 PERFORMANCE TRENDS (2010 – 2013)

Relative to the figures for the previous two years, there was an increase in the number of candidates that wrote the examination in 2013. There was also an increase (20 696) in the number that achieved at 30% and above in 2013 and at the 40% level (17 074). The number that wrote increased (by 15 635) from 225 874 in 2012 to 241 509 in 2013. Taken within the context of the increase in the number of candidates passing Mathematical Literacy, it is encouraging to see that the number of candidates with mathematical skills and competencies emerging from the schooling has grown significantly, especially in light of wider public concern about the waning mathematical skills of school going young people. The analysis shows an increase of 5.1 percentage point in the cohort of candidates who achieved at 30% and above and a 4.8 percentage point increase in the number of candidates who achieved at 40% and above in 2013, when compared to the figures for 2012.

**Table 10.1.1: Overall achievement rates In Mathematics**

Year	No. wrote	No. achieved at 30% and above	% achieved at 30% and above	No. achieved at 40% and above	% achieved at 40% and above
2010	263 034	127 785	47.4	81 473	30.9
2011	224 635	106 327	46.3	61 592	30.1
2012	225 874	121 970	54.0	80 716	35.7
2013	241 509	142 666	59.1	97 790	40.5

**Figure 10.1.1: Overall achievement rates In Mathematics**

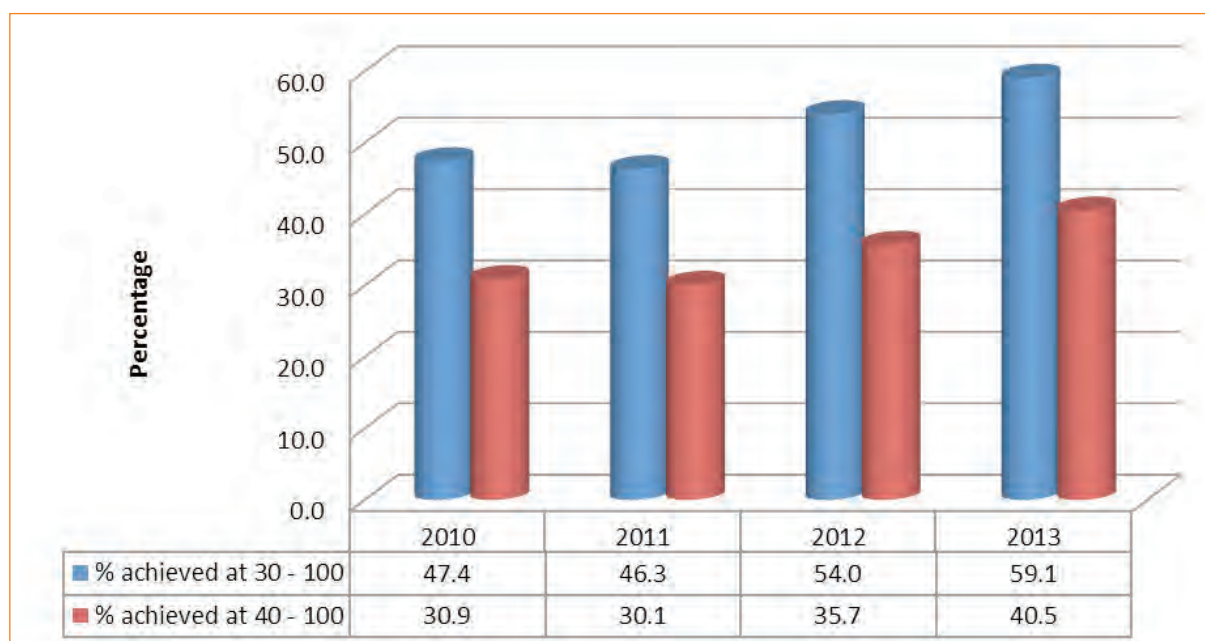


Figure 10.1.2: Performance distribution curves Mathematics (2011 - 2013)



## 10.2 OVERVIEW OF LEARNER PERFORMANCE IN PAPER I

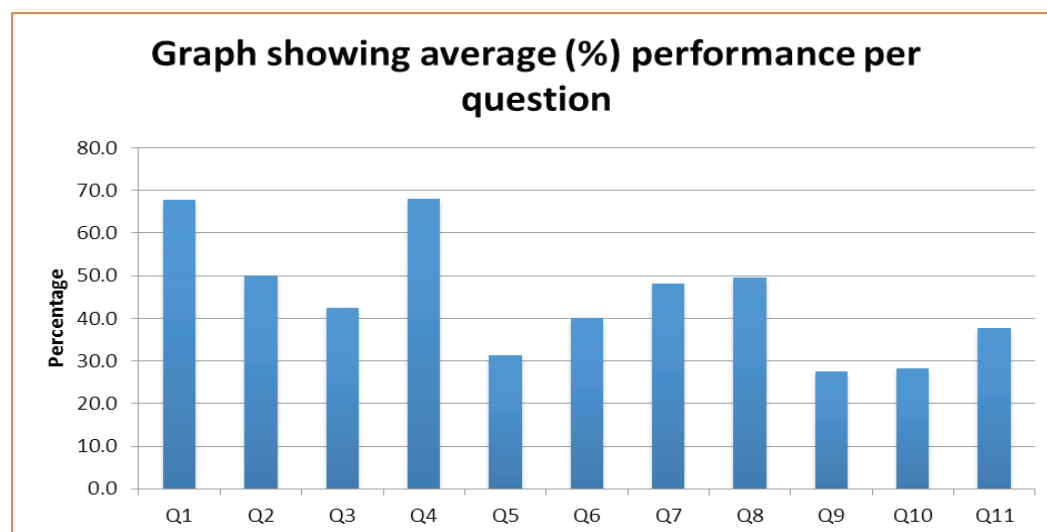
### General comments

- The paper was fair and well balanced. There was an even distribution of questions across the cognitive levels and candidates coped well with the paper. Some candidates did not show how they reached the answers. Learners should be encouraged to show all working steps in their answers instead of just giving the final answers.
- The learners performed well in the questions testing Grade 11 algebra and the parabola. The question on the hyperbola was asked in an interpretative way, which candidates found challenging. Application of calculus remains a concern as this was the question on which candidates performed most poorly. Most learners are still struggling to find the derivative using the first principle even though this problem has been highlighted in the previous diagnostic report. Teachers are encouraged to drill and practise the rules of differentiation correctly.
- The algebraic skills of the learners are poor. They struggle with Mathematics in Grades 11 and 12 because they cannot do the basic mathematics of Grades 8, 9 and 10. If this problem can be rectified, learners will perform much better in the Grade 12 examination. Solving inequality equations is still an area of concern.
- Problem-solving and non-routine, unseen questioning should be an integral part of classroom teaching.



## 10.3 DIAGNOSTIC QUESTION ANALYSIS FOR PAPER I

Figure 10.3.1 Graph showing the average percentage performance per question



Question	Topic/Section	Max Marks	Average %
1	Equations, inequalities and Algebraic Manipulation	22	67.7
2	Number Patterns & Sequences	18	50.1
3	Number Patterns & Sequences	18	42.6
4	Functions and Graphs – Parabola	10	68.0
5	Functions and Graphs – Exponential and Log Graphs	11	31.2
6	Functions and Graphs – Hyperbola and Exponential	11	40.1
7	Annuities and Finance	12	48.2
8	Calculus – 1 <sup>st</sup> Principle and using the rule	17	49.6
9	Calculus – Applications in cubic graphs	11	27.6
10	Calculus – Applications in rates of change	6	28.3
11	Linear Programming	14	37.7
	Average Total	150	

## 10.4 ANALYSIS OF LEARNER PERFORMANCE IN INDIVIDUAL QUESTIONS IN PAPER I

### QUESTION 1: Algebra

In general, this question was well answered with the exception of Questions 1.1.2 (b), 1.1.3 and 1.3. This question was attempted by all the learners and reasonably well answered by many who did not cope well with the rest of the paper.

#### Common errors and misconceptions

- (a) Learners are still copying the quadratic formula incorrectly from the information sheet. Either they have copied it incorrectly or they have learnt it incorrectly and not used the formula sheet.

- (b) In question 1.1.2 (b), learners did not realise that they must take out a common factor of  $x$ . Many differentiated as they saw a cubic function and then solved for  $x$ . Very few connected it to question 1.1.2 (a). Many learners applied the quadratic formula directly to the cubic equation as if it was quadratic. No marks were awarded for this approach.
- (c) In general, there is still a poor understanding of inequalities. Most learners could get the critical values but could not represent the final solution as an inequality. Although they might have drawn the graphical solution, they then lost marks because they failed to write it correctly. Learners do not clearly understand the meaning of 'and' and 'or', as well as proper notation for expressing intervals in Mathematics. Learners still do not realize that the inequality sign needs to be reversed when dividing by a negative number and many treated the inequality like an equation
- i.e. from  $(x + 7)(x - 5) < 0$  to  $x + 7 < 0$  and  $x - 5 < 0$ .
- (d) There is a definite lack of understanding of and ability to apply exponential laws.

### Suggestions for improvement

- (a) Learners should be encouraged to reproduce and use the quadratic formula correctly.
- (b) Teachers need to show learners more examples of solving cubic equations by means of taking out a common factor.
- (c) Teachers should show learners how to solve quadratic inequalities with the aid of graphs.
- (d) Understanding of why a product would be positive or negative or zero is essential. Emphasis should be placed on understanding the notation when solving inequalities.
- (e) Teachers should use more examples of a higher order in their teaching, especially when solving problems with inequalities.
- (f) Learners should practise more examples, using factorization when simplifying exponents.
- (g) Learners have to be reminded constantly that if they are required to solve quadratic or cubic equations, when the equations are given in factorised form, e.g. question 1.1.3  $-3(x + 7)(x - 5)$ , they should understand that they can just use the given factors – instead of multiplying out and then trying to factorise again.
- (h) Teachers must use the correct mathematical language in the classroom. Learners should understand the concept of standard form.
- (i) Set builder and interval notation should be dealt with intensively in grades 9 and 10. This will assist learners to use notation correctly in grades 11 and 12.

### QUESTION 2: Patterns

Many learners performed well in this question.

#### Common errors and misconceptions

- (a) In question 2.1, most learners did not give both solutions, i.e.  $\pm 21$  as the solution to the quadratic equation. They lost one mark by leaving out one solution.

- (b) In question 2.2, some learners used the formulae for an arithmetic progression instead of the geometric progression. Some learners also subtracted the terms and then used them as the common ratio which was then used in the geometric formula. This indicates that learners do not clearly understand the different characteristics of arithmetic and geometric sequences.
- (c) The law of exponents is still a challenge for some learners. The rules of exponents were applied incorrectly.
- (d) In question 2.3.2, many learners used  $n = 500$  because they could not distinguish this series as a combination of two different series.
- (e) Question 2.4.2 was very poorly answered as learners did not understand what was required. There is definitely a poor understanding of sigma notation and what it represents.

### Suggestions for improvement

- (a) Teachers need to emphasize that a quadratic equation always has 2 solutions. They should show learners where it comes from in order to avoid this common error. Learners lost marks when they divided by the common factor,  $x$ .
- (b) Learners should be exposed to a sequence as a combination of two sequences.
- (c) Teachers should make sure that learners know very well the difference between an arithmetic and a geometric sequence.
- (d) Learners need to identify the type of sequence correctly in order for them to use the correct formula associated with the given sequence.

### QUESTION 3: Patterns

Question 3.1 is a well-designed test of Arithmetic sequences covering all cognitive levels. While Questions 3.1.1 and 3.1.2 were well answered, Questions 3.1.3 and 3.1.4 were among the worst-answered questions in the paper.

### Common errors and misconceptions

- (a) In question 3.1.1, a misinterpretation of the question often led to learners' calculating more than the question requested. The calculation of  $T_n = 393$  was not asked for.
- (b) Candidates did not understand the concept of remainders. As a result, Questions 3.1.3 and 3.1.4 were very poorly answered.

### Suggestions for improvement

- (a) Basic algebraic manipulation needs attention. This involves being able to substitute correctly and solve quadratic equations correctly.
- (b) Theory is an integral part of sequences and series – learners must be taught to distinguish which formulas to use.
- (c) Teachers need to use the concepts of remainders, divisible by, quotient, multiple etc. in their teaching. This is assumed knowledge from primary school but it needs to be reiterated in our teaching and assessments.

- (d) Learners need to be familiar with the terminology of Mathematics. Teachers should use the correct terminology in class so that learners understand various mathematical concepts.
- (e) Teachers should challenge learners during teaching and in assessments by using different types of problems, including sequences that have negative values, fractions and word-type problems.
- (f) Correct notation and mathematical language should be used on a daily basis in the classroom.
- (g) Learners should be encouraged to use mathematical language in class.

#### QUESTION 4: Functions (Parabola)

This question was well answered by many candidates.

##### Common errors and misconceptions

- (a) Learners should always remember to indicate that  $y = 0$  for an x-intercept.
- (b) Some learners are still unable to plot points correctly on the Cartesian plane.
- (c) Some candidates confused the parabola with the cubic function.

##### Suggestions for improvement

- (a) Learners must be taught **always** to write intercepts in coordinate form. They should also show substitution when applicable.
- (b) Learners should understand that in quadratic functions differentiation can also be used to calculate turning points instead of only  $x = -\frac{b}{2a}$ .
- (c) It is necessary for the basic functions to be practised on a regular basis.
- (d) Basic mathematical principles and rules need to be practised continually. Problems again include factorisation, the difference between intercepts and coordinates and the use of incorrect formulae for the turning point.
- (e) Learners should be taught to recognise the various algebraic forms of functions and the concomitant graphic representations.
- (f) Teachers should train learners on how to sketch a graph and vice versa to derive its equation if it is drawn. Teachers are encouraged to use various methods to find the turning point and the axis of symmetry.
- (g) The effect of the parameters a, b and c on the shape of the graph should be emphasised.

#### QUESTION 5: Functions (Exponential & Logarithmic)

With the exception of Questions 5.1.1 and 5.1.2, this question was poorly answered.

##### Common errors and misconceptions

- (a) Many learners understood the algorithm of deriving the inverse equation. However, the concept of domain, range and asymptotic behaviour of functions was lacking.

- (b) Learners struggled with the interpretation of Question 5.1.3; the problem stemmed from the notation.
- (c) Many learners did not see the relationship between questions 5.1.4 and 5.1.3, i.e. that the graph had been transformed.
- (d) Many learners did not know the inverse of a horizontal line to be a vertical line. Learners drew inverses of familiar graphs, i.e. exponential or log graphs.
- (e) Learners struggled to clearly identify and/or give the definition of a function. This was evident in the fact that learners were not clear about terminology such as 'one-to-one' and 'one-to-many'. Most learners lost 4 marks because of the interpretation of the inverse function in 5.2.1.

### Suggestions for improvement

- (a) Teachers need to spend more time explaining application questions of graphs such as:  $f(x) < 0$ ,  $f(x) > g(x)$  and  $f(x).g(x) < 0$ , as well as the transformations of graphs. Learners have to be exposed to more higher-order questions involving solving inequalities from graphs.
- (b) The inverses of the straight line and the parabola need as much attention as the inverse of the exponential graph.
- (c) It is very important to teach inverses as an extension of functions so that learners can understand what restrictions apply to functions and domains, ranges etc. Teachers need to teach learners to be able to convert flexibly from symbolic expression to words .
- (d) The formal definition and understanding of a function should be emphasised.

### QUESTION 6: Functions (Hyperbola)

#### Common errors and misconceptions

- (a) In question 6.1.1, learners could generally determine the value of p, but were less successful with determining the value of d.
- (b) Learners did not understand the format of the function and did not recognise that this was a hyperbola. This was an unfamiliar question about a hyperbola with two unknown values and it has never been tested before. It is also problematic that learners use one point to prove the equation of the sketched graph whereas the equation has two unknown values. Learners do not understand that the point (2 ; 0) can lie on many different graphs and not merely this one particular graph. For that reason, the use of the one point to prove that the equation of the graph is as it was given, was awarded no marks.
- (c) Learners coped fairly well with Question 6.2 and lost marks only for incorrect substitution or calculations.

#### Suggestions for improvement

- (a) Expose learners to questions that are asked in a different way.
- (b) Learners must be able to use the characteristics of a function to determine its equation and vice versa.
- (c) Learners need to be exposed to fractions of this kind,  $f(x) = \frac{-3}{x+1} + 1 = \frac{x-2}{x+1}$ , in grade 10. This can be proved by algebraic manipulation.

- (d) The effect  $p$  and  $q$  on the graphs,  $y = a(x + p)^2 + q$ ;  $y = \frac{a}{x + p} + q$  and  $y = a^{x+p} + q$  must be clearly understood by learners. The  $q$ -value is direct in terms of the sign value and determines horizontal shifts, whereas the sign of the  $p$  value changes and indicates vertical shifts.
- (e) Make sure that all learners understand the use of brackets in interval notation, i.e. round brackets exclude the endpoints while square brackets include the endpoints.
- (f) The theory of functions needs to be taught properly. This includes both definitions of functions/relations and how the graph is affected by the changes to the equation of the function/relation.

## QUESTION 7: FINANCE

### Common errors and misconceptions

- (a) Learners did not know the formula to use to calculate the effective interest rate. Learners battled to differentiate between effective and nominal interest rates. Some learners could not express  $i$  when compounded quarterly. If the learners were able to remember the formula, their substitution into the formula was generally poor. Learners also confused the effective interest of 0,09308 and the effective interest rate of 9,31%.
- (b) Learners were able to apply the logs to calculate  $n$  effectively. Learners did not solve for  $k$  but rather for  $n$ . The rounding of  $k$  to the nearest year was done poorly. Learners were confused about the nominal and the effective interest rate. This showed in their substitution into the formula. Some learners realised their mistake and corrected it at the end of their solution.
- (c) The detail, 'one month after the loan was granted' was misinterpreted and learners used  $n$  as being 299 or 301.
- (d) Learners mixed up the future value formula and the present value formula.
- (e) In the present value formula, learners forgot to use the exponent as ' $-n$ '.
- (f) If learners used the future value version of this solution, it was dismally answered. Learners did not calculate the interest earned on the original amount borrowed.

### Suggestions for improvement

- (a) Teachers need to emphasise the use and concept of the present and future value formulae.
- (b) The calculation of the effective interest rate should be revisited.
- (c) Learners must check whether their solution seems 'reasonable'. For example: A bond repayment on a house for R750 000 will not be R25,72 per month or a person earning R18 480 per month cannot spend R61 600 on a bond repayment per month.
- (d) Teachers need to expose learners to all terminology with respect to financial mathematics, i.e. reducing balance/diminishing balance/compound decay/compound decrease; straight-line depreciation/linear reduction/straight line decay; compound increase/compound growth/inflation
- (e) As language presents problems in correctly interpreting finance questions, teachers should use the correct language both while teaching and in the assessment the learners are required to do.

- (f) Teachers should emphasise the importance of not rounding off in the middle of a financial mathematics (or any other) problem.

## QUESTION 8: Calculus

### Common errors and misconceptions

- (a) Similar mistakes are recurring where learners copy the formula incorrectly from the formula sheet with regard to the first principle. Most learners wrote  $f(x) f(x)$  instead of  $f'(x)f'(x)$ .

- Many notation errors occurred in this question, for example  $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$  was written down as  $f(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$  or as  $f'(x) = \frac{f(x+h) - f(x)}{h}$  or  $\lim_{h \rightarrow 0} = \frac{f(x+h) - f(x)}{h}$ .

- (b) They wrote  $f'(x) = \lim_{h \rightarrow 0} (6x + h)$  as  $f'(x) = \lim_{h \rightarrow 0} 6x + h$  or they wrote  $\lim_{h \rightarrow 0} (6x + 3(0))$  which was incorrect.

- (c) Learners incorrectly substituted  $x + h$ , they wrote  $\lim_{h \rightarrow 0} \frac{3(x+h)^2 - (3x-4)}{h}$  instead of  $\lim_{h \rightarrow 0} \frac{3(x+h)^2 - 4 - (3x-4)}{h}$ , omitting the '- 4' and then could not get the derivative correctly from first principles.

- (d) Learners made many algebraic mistakes in the simplification part.

- (e) Some learners did not follow the instruction of first principles; they applied the rules and only wrote down the answer. No marks were awarded in this case.

- (f) Learners struggled to calculate the  $x$  and  $y$  values needed to calculate the average gradient or they did not realise that they needed to calculate these values.

- (g) Many learners made up their own values for  $x$  and  $y$  so that they could calculate an average gradient.

- (h) Notation in Question 8.2 was also handled poorly.

- (i) The simplification of the expression in question 8.2 was problematic. Many learners simplified the expression incorrectly. The complexity of having a root and fraction made the manipulation difficult for the learners.

### Suggestions for improvement

- (a) Teachers need to stress the importance of **notation** in answering a first principles question. It seems as if learners handled this question better when they simplified  $f(x+h) - f(x)$  or even the fraction  $\frac{f(x+h) - f(x)}{h}$  first and then applied the limit as  $h \rightarrow 0$  of the simplified fraction.

- (b) The drill and practice of the correct notation and rules of differentiation is necessary. The original function MUST be in terms such that one can correctly identify the coefficient, variable and exponent BEFORE the rules of differentiation can be applied.

- (c) Using colours to distinguish between the original function and the derivative might assist learners with correct notation.

- (d) Fractions and exponential laws must be emphasised when working with Calculus.
- (e) Do drill and practice exercises for first principles, e.g.:
- $$f(x) = 2 - 3x^2 \quad f(x) = -\frac{2}{x}$$
- $$f(x) = -x^2 \quad f(x) = 5x^2 - 4$$
- $$f(x) = \frac{1}{x}$$
- (f) When differentiating by rules, learners need to understand what the original expression consists of. Identify the fractions, exponents and  $\sqrt{\quad}$  in the original expression. Make sure that learners KNOW how to simplify before differentiation.
- (g) For fractions, it is always better for the learners to do the following to simplify:
- $$\frac{x+5}{\sqrt{x}} = \frac{x}{x^{\frac{1}{2}}} + \frac{5}{x^{\frac{1}{2}}}$$
- $$= x^{\frac{1}{2}} + 5x^{-\frac{1}{2}}$$
- (h) Emphasise the difference between gradient and average gradient.
- (i) Learners need to **READ** the question carefully before responding to what is asked of them.

### QUESTION 9: Calculus (Graphical Application)

#### Common errors and misconceptions

- (a) In answering Question 9.1, candidates used the given values of a and b to substitute into the equation to show that the graph has a turning point at P. Learners still struggle with the concept that the derivative is zero at a stationary point. Some learners set  $f(x) = 0$ .
- (b) As mentioned above, answers to Question 9.3 showed that the concept of transformation is poorly understood when used in the context of a function. Many candidates opted for the algebraic approach in determining the new function and obtaining its turning point(s).

#### Suggestions for improvement

- (a) Teachers need to expose learners to questions in which variables have to be obtained from various items of given information.
- (b) Teachers needs to re-emphasise that if (a;b) is a stationary point of  $y = f(x)$  then it follows that  $f(a) = b$  and  $f'(a) = 0$ .

### QUESTION 10: Calculus (Application)

This question was generally very poorly answered.

#### Common errors and misconceptions

- (a) The application of calculus has always been a problem. The learners generally did not understand the use of the word rate. Many learners used the  $f(x) = 0$  equation in Question 10.1 and the derivative in Question 10.2. As stated in previous reports, the conceptual understanding of the application of differential calculus is still seriously problematic.



- (b) Many learners took the derivative in Question 10.2, which reinforces the notion of the misunderstood conceptual understanding of application of differential calculus.

### **Suggestions for improvement**

- (a) Teachers must spend more time showing pupils a variety of different questions involving rates of change, as well as allow their learners to practise related previous examination questions.
- (b) Application and/or word problems involving differentiation need to be taught with a positive approach and be introduced as early as possible so that learners have a good grasp of the language involved.
- (c) Teachers need to do more examples of application of differential calculus as this is an important part of Mathematics. Learners need to be exposed to questions involving rate of change in practical situations and not just graphs. Many textbooks do not have sufficient examples of such questions, involving a variety of applications of differential calculus.

### **QUESTION 11: Linear Programming**

This question was poorly answered. This was, however, the last year that Linear Programming as a section will be tested as it does not form part of CAPS.

### **Common errors and misconceptions**

- (a) Many learners could not set up the constraint for: 'at most 5 long-sleeved shirts must be manufactured for every short-sleeved shirt'. This constraint involved a ratio of the two variables and many learners answered it incorrectly by writing  $x \geq 5y$ . Many also used incorrect inequality signs when setting up constraints.
- (b) Question 11.4 was poorly answered. Learners had difficulty in finding the gradient of the line when the profit existed along the boundary of the feasible region.

### **Suggestions for improvement**

- (a) Learners must practise setting up constraints involving a ratio. This could include questions in which the profit line lies on the boundary of the feasible region.
- (b) A variety of problems of this nature should be set in school-based assessment tasks and preparatory examinations.

## **10.5 OVERVIEW OF LEARNER PERFORMANCE IN MATHEMATICS PAPER 2**

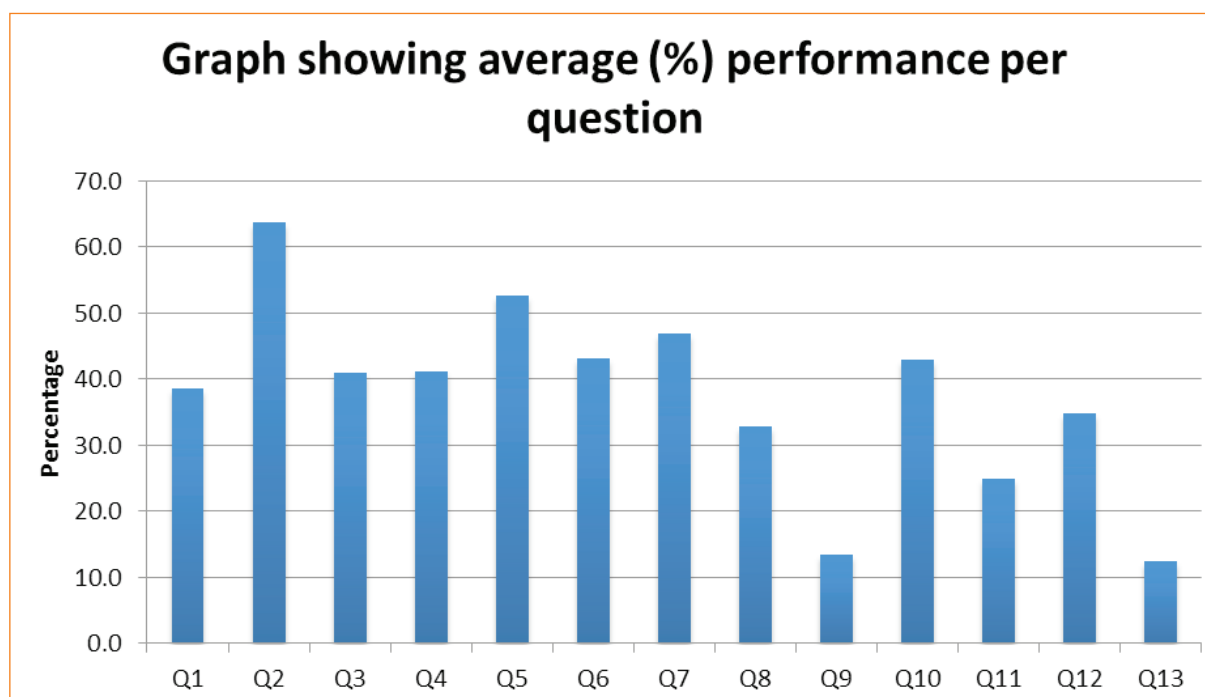
### **General comments**

- (a) The paper was seen as challenging. There were some unseen and unfamiliar questions which challenged even the top candidates. However, there were still enough marks that could be scored by the weak-to-average candidate. Learners should be encouraged to show all working steps in their answers instead of just giving the final answers. Problem-solving and non-routine, unseen questioning should be an integral part of classroom teaching.
- (b) Candidates performed best in Analytical Geometry. The questions on Data Handling and Transformation Geometry contained interpretative questions and this resulted in a slight decline in performance in these sections of the paper. Performance in the Trigonometry section is a cause for concern as candidates performed poorly on questions that tested basic knowledge.

- (c) The literacy levels of many candidates is a cause for concern. This is evident in the many instances where responses to questions were far removed from the required answer. For example, where the question asked about the probability of having an accident if one's blood alcohol level is 0,18, candidates responded about the effects of consuming alcohol and driving, and when asked how the marks of school A can be adjusted to match those of school C, candidates wrote about the intervention strategies that could be implemented to increase the performance level in school A.
- (d) It is evident that many of the errors made by candidates in answering this paper have their origins in a poor understanding of the basics and foundational competencies taught in the earlier grades. For example, a lack of knowledge that a trigonometric ratio is equal to some numeric value, the inability to recall the formulae for the area of a triangle and the area of a circle, the inability to distinguish between a rule and a description in Transformation Geometry and the poor recall of reduction formula and trigonometric identities.
- (e) The item-by-item analysis reveals that many candidates were mostly exposed to knowledge and routine-type questions. They struggled with concepts in the curriculum that required deeper conceptual understanding. Questions which required the interpretation of information or provide justification presented challenges to most. There is also evidence that some candidates' preparation included standard responses to questions; for example, some candidates wrote about the skewedness of the box and whisker diagrams, when in fact the required response relates to the variation between the quartiles.
- (f) Many candidates had difficulty in responding to concepts tested previously but asked differently in this paper. This suggests that the 'stimulus-response' method makes up much of the teaching strategy. Consequently, these candidates lack the ability to respond to complex and higher-order questions that require a deeper understanding.
- (g) A number of candidates lacked the necessary insight to deal with questions based on compound angles and interpretative questions on trigonometric functions. Many candidates did not answer Question 13 or they made a poor attempt at it. This shows that many candidates cannot relate Mathematics theory to everyday situations. It was good however that this question came at the end of the paper and did not negatively impact on candidates early in the examination.
- (h) In general, candidates need to exercise caution with algebraic manipulation skills as 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 it provides the answer to all their Mathematics problems. Some candidates need to realise that conceptual development and algebraic manipulation are often impeded as a result of an overdependence on the calculator.
- (i) Euclidean Geometry does not form part of the core Mathematics curriculum. However, it is expected that candidates have knowledge of the definitions and properties of triangles and quadrilaterals as this is covered in the Grade 10 curriculum. This should be revised in the lead-up to the teaching of Analytical Geometry.

## 10.6 DIAGNOSTIC QUESTION ANALYSIS FOR PAPER 2

Figure 10.6.1: Graph showing the average percentage performance per question



No.	Type of Question	Maximum	Average %
1	Data handling	6	38.7
2	Data handling	7	63.7
3	Data handling	5	40.9
4	Data handling	7	41.2
5	Analytical Geometry	15	52.7
6	Analytical Geometry	24	43.1
7	Transformation Geometry	6	46.9
8	Transformation Geometry	10	32.8
9	Transformation Geometry	10	13.5
10	Trigonometry	8	42.9
11	Trigonometry	30	24.8
12	Trigonometric functions	13	34.8
13	Trigonometry	9	12.5
	Av. Total	150	

## 10.7 ANALYSIS OF LEARNER PERFORMANCE IN INDIVIDUAL QUESTIONS IN PAPER 2

### QUESTION 1: Data Handling

#### Common errors and misconceptions

- (a) Candidates did not realise that the minimum information required for drawing a box and whisker diagram is a five-number summary. Consequently, many of them could not see the link between the five-number summary and the given box and whisker diagram.
- (b) While many candidates were able to answer 1.1 correctly, it is cause for concern that a number of candidates were unable to answer this question correctly. Their difficulty was that they did not understand the concept of inter-quartile range. Some candidates confused inter-quartile range with semi-inter-quartile range and others with range, i.e. Inter-quartile range =  $\frac{Q_3 - Q_1}{2}$  or Inter-quartile range = maximum – minimum.
- (c) In answers to Questions 1.2 and 1.3, candidates' misconceptions are grounded in poor language background. Candidates had difficulty in decoding 'in excess of' and 'least variation'. Some were able to provide the correct answer to 1.3 but were unable to provide an acceptable reason for their choice.
- (d) Many candidates were unable to interpret the box and whisker diagram. They did not realise that quartiles divide a data set into four quarters, each of which has 25% of the data. There is confusion between quartiles and quarters.
- (e) Some candidates' response to 1.3 was about skewedness of the box and whisker diagram, even though the question did not ask about it.

#### Suggestions for improvement

- (a) Statistical literacy is not just about procedures to calculate an answer or to draw a graphical representation. Interpreting data and drawing appropriate and valid conclusions is much needed in everyday life. Hence analysing data must be the focus of teaching and learning.
- (b) If learners are studying in a language that is not their home language, teachers need to ensure that the concepts used in Mathematics are thoroughly explained to them.
- (c) Learners need to be made aware that a box and whisker diagram is drawn using the values in the five-number summary. So in preparation for this, teachers should not only ask learners to identify the quartiles in a data set but also write down the five-number summary for the data set.
- (d) The emphasis in teaching the box and whisker diagram is on its representing the data set as four sections, each of which contains 25% of the data. But more than that, the space between the values tells us how closely together or widely spread the data are for that section.
- (e) Once learners have understood the idea of the spread of data in each section of the box and whisker diagram, the teacher should then focus on the idea of skewedness.

## QUESTION 2: Data Handling

### Common errors and misconceptions

- (a) While most candidates were able to plot the points correctly in the scatter plot, some plotted the last point at 0,25 on the x-axis instead of 0,21. This was because the interval between all the previous points was 0,05.
- (b) There is a misconception that the line of best fit is a straight line. Many candidates drew a straight line instead of an exponential curve as a line of best fit. Some candidates connected all the points by using a ruler.
- (c) Candidates did not know the meaning of the word 'trend'. Some confused it with 'correlation'. Candidates had difficulty in describing the trend between the two variables with many of them providing incomplete answers or not explicitly describing the trend as exponential.
- (d) In 2.4, candidates did not realise that 'probability' is the same as 'relative risk'. Many of them did not realise that they had to read off a value from the graph. Some took the midpoint of 24,8 and 72,2 as the answer while others spoke of the effects of drinking and driving.

### Suggestions for improvement

- (a) The concept: the line of best fit should not be taken literally to mean a straight line only. The line of best fit includes a straight line, a quadratic or an exponential curve. In the case of the quadratic or exponential curve, the line of best fit is a smooth curve and learners are advised not to use a ruler to draw these curves.
- (b) When teaching scatter plots, teachers should include examples where the line of best fit is quadratic or exponential and not only focus on those where the line of best fit is a straight line.
- (c) Teachers need to explain the different terms that learners will encounter in this topic. Poor understanding of these terms is a contributory factor to the learners' confusion.
- (d) Learners must be encouraged to be explicit in describing the trend between variables. Merely stating that there is an increasing trend could imply a linear relationship between the variables. However, stating that as one variable increases the other increases rapidly distinguishes an exponential situation from the linear case.
- (e) Teachers are encouraged to experiment with data sets. Allow learners to interpret the data sets for trends and other salient features. These interpretations should be debated vigorously in the class to ensure that the conclusions reached are valid. Learners should be encouraged to think critically and not be afraid of making mistakes.

### QUESTION 3: Data Handling

#### Common errors and misconceptions

- (a) Some candidates clearly did not realise that the cumulative frequency in this context actually referred to the total number of people that had left the auditorium at different time intervals.
- (b) It is concerning to note that a number of candidates were unable to read correctly off the ogive.
- (c) In answering 3.1 and 3.2, candidates did not subtract the readings taken off the y-axis of the ogive. Instead, they merely wrote down these readings as an answer. This shows a lack of understanding that they had to work out the number of people leaving within a particular time interval.
- (d) Very few candidates were able to answer 3.3 correctly, with a number giving a single value instead of an interval. Candidates were unable to write the interval in correct notation. While candidates might be familiar with the concept of mode or modal class if the data is given in table form, candidates had difficulty in identifying the modal class from the ogive.

#### Suggestions for improvement

- (a) As a starting point, learners need to realise that the cumulative frequency is the total of all the frequencies up to that point. For example, at 15 minutes the cumulative frequency reads 104. This means that a total of 104 people had left the auditorium in 15 minutes or less.
- (b) The ogive is a graphical representation of a cumulative frequency table.
- (c) Learners should exercise care when reading off a graph. If need be, they should use a ruler to ensure more accurate readings.
- (d) While it is a routine task to draw an ogive from a cumulative frequency table, it is advisable that teachers also demonstrate how the cumulative frequency table can be derived from the ogive and, to take it slightly further, how the frequency table can be constructed from a cumulative frequency table.
- (e) The frequency table should be viewed alongside the ogive. In this way, learners should be able to identify the modal class in the ogive more readily as the part of the curve where the gradient is the steepest.
- (f) Learners should also be shown how to draw a box and whisker diagram from an ogive.
- (g) Learners should be exposed to answering interpretation-type questions as part of their activities and not only in tests and examinations. They should be made aware that Data Handling encompasses gathering information, summarising the information, interpreting the results so that meaningful conclusions can be made and making predictions for the future.

## QUESTION 4: Data Handling

### Common errors and misconceptions

- (a) Candidates were unable to see the link between the information provided in the table and the distribution curves.
- (b) Candidates were unable to make comparisons between the results of the schools by using the information on the table and the distribution curves.
- (c) Language still poses a barrier to many candidates. In trying to answer 4.1, candidates could not interpret 'spread around the mean' correctly. This led to candidates' becoming confused as to whether they should focus on the mean or the standard deviation in answering this question. In 4.2, the 'difference in spread' was taken as subtracting two values.
- (d) Also in 4.1, candidates were able to identify the school correctly but were unable to provide a reason in terms of the standard deviation but rather repeated the words used in the question.
- (e) In 4.3, candidates focused on the difference between the means of the two schools rather than what should happen to the marks of school A so that they would match those of school C. Some candidates stated that the marks should increase by 5%, which is making the assumption that the marks were given as a percentage. That was not the case. Many candidates gave all kinds of advice on intervention strategies that school A could implement to improve their results.
- (f) In 4.4, many candidates answered correctly that the mean would decrease but failed to realise that the standard deviation would also decrease. Many candidates did not realise that a percentage decrease meant that the top learners lost more marks than the bottom learners. Consequently, the marks were actually getting closer around the mean and hence the standard deviation would also decrease. Many candidates assumed that the 10% decrease would result in a uniform decrease across all the marks and therefore this would not affect the standard deviation.

### Suggestions for improvement

- (a) Teachers need to emphasise the terminology used in Statistics and explain the meaning of terms used in this section.
- (b) Learners need to distinguish between measures of central tendency and measures of spread (or dispersion). The mean is a measure of central tendency and the standard deviation describes how the data are spread on either side of the mean.
- (c) The concept of standard deviation runs far beyond the calculation of some values. Unless learners are taught the concept of standard deviation, the calculated value is meaningless. In this regard, teachers are advised to discuss the formula and perform a few calculations using the formula so that learners become familiar with the concept. Learners should then be able to visualise that a small standard deviation indicates that the data values are closely grouped around the mean, whereas a large standard deviation indicates that the data values are more widely spread around the mean. Once this generalisation is established, learners should be allowed to use the calculator to determine the standard deviation, as it is by far a more efficient method.
- (d) Teachers should integrate interpretation and mathematical reasoning into routine tasks.

## QUESTION 5: Analytical Geometry

### Common errors and misconceptions

- (a) Candidates were unable to calculate the gradient of a line given its inclination. Some started as  $\tan \theta = 63,43^\circ$ . A number of candidates attempted to calculate the gradient by using the formula  $m = \frac{y_2 - y_1}{x_2 - x_1}$  even though one point on the line was given. Others calculated the coordinates of S first and then calculated the gradient.
- (b) In 5.1.2, candidates did not write down the equation in the required form.
- (c) Some candidates did not realise that S is the y-intercept of PT. They could not see the link between 5.1.2 and 5.1.3.
- (d) Some candidates were unable to use the midpoint formula to calculate the coordinates of one of the endpoints of the line segment.
- (e) In 5.2, many candidates were unable to use the ratio to calculate the coordinates of R. Consequently they were unable to calculate the length of PR.
- (f) In 5.3, many candidates assumed that either TR or PR was the perpendicular height in calculating the area of the triangle. Some used the area formula but made incorrect substitutions into the formula. A fair number of candidates stated that  $\text{Area} = \frac{1}{2} T.R \sin q$  instead of  $\text{Area} = \frac{1}{2} t.r \sin q$ . Clearly these candidates are unaware of the difference between vertices and sides of a triangle. Some candidates could not recall the formula for the area of a triangle.

### Suggestions for improvement

- (a) Learners should develop the skill of associating information in a question with the correct formula given on the information sheet.
- (b) Learners should be able to recall concepts taught in earlier grades and be able to integrate these in different sections. The topic of ratio is dealt with in Grade 9 but is still applicable to Grade 12.
- (c) Learners should be made aware of the minimum conditions that must exist in order to use a certain formula. For example, if a learner wishes to calculate the gradient by using the formula  $m = \frac{y_2 - y_1}{x_2 - x_1}$ , then two points on the straight line must be known or given. If a learner wishes to calculate the area of a triangle by using the area formula  $\text{Area} = \frac{1}{2} ab \sin C$ , then two sides and the included angle should be known or given.
- (d) Learners should be reminded not to make any assumptions about lines in the diagram, whether it might look so on the diagram or not.
- (e) More examples must be given where learners are required to manipulate a formula. It is pointless having a number of exercises that simply drill the direct use of the formula.



## QUESTION 6: Analytical Geometry

### Common errors and misconceptions

- (a) Candidates were unable to use any applicable method to determine the coordinates of the centre of the circle. Many of those who opted to use the method of completing the square were unsure about it. Common errors were that they did not complete the square on both sides, omitted signs between terms or omitted the square signs outside each bracket.
- (b) Candidates interchanged the  $x$ - and  $y$ -coordinates and obtained a negative gradient for MR. Others were unable to substitute correctly into the gradient formula. Some did not realise that the  $y$ -intercept of MR was  $-4$ .
- (c) Candidates were unable to identify the perpendicular lines and hence found it difficult to show that  $q = 2 - p$ .
- (d) In 6.4, candidates were able to state that  $p = 6$  and that  $q = -4$  but were unable to provide the relevant explanation for it. Others did not realise that this question could be answered solving  $q = 2 - p$  and another equation simultaneously. A number of candidates had no idea how to answer this question.
- (e) In 6.5, candidates found that  $r^2 = 52$  but either did not substitute 52 back into the equation of the circle or they substituted  $\sqrt{52}$  for  $r^2$ .
- (f) In 6.6, candidates were unable to recall the formula for the area of the circle: they used  $A = 2pr$  or  $A = 2pr^2$ . Some used  $r = \sqrt{52}$  in their calculations.
- (g) In 6.7, few candidates understood that they needed to calculate two lengths first and then state the ratio. Some performed long, tedious calculations that were unnecessary while others were able to give the answer but were unable to provide acceptable supporting reasons for their statements.

### Suggestions for improvement

- (a) Whilst Euclidean Geometry is no longer tested in the core curriculum, definitions and properties of polygons are regarded as prior learning knowledge in the answering of Analytical Geometry. Therefore, teachers need to reinforce them before commencing the teaching of Analytical Geometry.
- (b) Teachers should develop the skill of analysing a given diagram for salient features. Learners should be encouraged to identify equal sides, equal angles, right angles, etc in a diagram. This information could be used in the answers without having to perform tedious calculations.
- (c) Learners should be encouraged to show all working steps in their answers. There are a number of 'short methods' that could be employed in arriving at some of the answers. However, these 'short methods' are based on some or other aspect of Mathematics, for example the properties of a square. When arriving at answers by inspection, candidates are expected to provide some kind of explanation for it.
- (d) Learners are encouraged to test their answers against the diagram, particularly when it comes to the gradient of a line.

## QUESTION 7: Transformation Geometry

### Common errors and misconceptions

- (a) Responses to this question varied greatly. While some candidates achieved full marks, others could not recall the rules for transformations.
- (b) Candidates found the double transformation to be a challenge. They did not understand the continuity in the transformation process. When obtaining the image of the second transformation, they returned to the original point rather than using the image obtained in the first transformation.
- (c) Candidates could not see the link between 7.1 and 7.2 with 7.3. Consequently, some of them did not know what was required by the question. This could have been on account of candidates' having a poor understanding of the spoken language.
- (d) Many candidates were able to state that Mo was correct but were unable to provide an acceptable reason for their choice. Some merely repeated the words used in the question.
- (e) In 7.3, some candidates made the choice that the order of the transformations did not matter. They then went back to 7.1 and/or 7.2 and changed their answers so that they were the same in both cases. In the process, these candidates had changed correct answers to incorrect ones.

### Suggestions for improvement

- (a) It would seem as if Transformation Geometry is being taught as a set of rules in a very abstract way, yet this section of work opens itself to lots of practical work and experimentation.
- (b) Plotting a point or shape and its image on a set of axes should give learners a better perspective as to how the point or shape has been transformed. This is particularly so in the case of multiple transformations.
- (c) Learners should be taught to explain their observation of certain general rules either in writing or orally. Clear communication is an important goal in the teaching and learning of Mathematics.

## QUESTION 8: Transformation Geometry

### Common errors and misconceptions

- (a) Many candidates were not familiar with the term 'rigid transformation'. This lack of understanding had an impact on the answering of this question as a whole.
- (b) Some provided random, irrelevant answers that showed a lack of pattern or logical thinking.
- (c) In 8.1, candidates were unable to describe the transformation shown in the sketch. Some were confused between a description using words and the rule. Others described it as a transformation rather than a translation. Some merely stated 4 units to the left and 4 units up. This is an incomplete description.
- (d) Some candidates were unsure if the signs should change when reflecting about the line  $y = x$ . The lack of understanding of basic work is cause for concern.
- (e) Many candidates were unable to calculate the scale factor of the enlargement when given the ratio of the area of the original shape and its image. Many stated that the scale factor was 16.
- (f) Many candidates did not realise that under a rigid transformation,  $AC = EF = \sqrt{10}$ . Candidates had to use the coordinates of E and F and  $\sqrt{10}$  in the distance formula to obtain the equation required in 8.4. Some candidates used the straight line formula to determine the equation.

### Suggestions for improvement

- (a) Teachers should explain the different ways of representing transformations, emphasising that a description is a verbal (word) representation while a rule is a symbolic representation.
- (b) Teachers should explain the need for complete descriptions when describing transformations. The type of transformation is integral in its description. Teachers should encourage the correct use of terminology in class.
- (c) This topic lends itself to a lot of practical work. Teachers are encouraged to allow learners to investigate concepts rather than to ask them to memorise a set of rules.
- (d) Transformation Geometry as a stand-alone topic will not explicitly be part of the curriculum from 2014 onwards. However, it must be noted that it will be tested to a limited extent in functions (graphs). Teachers are advised to use the appropriate transformation terminology when describing how functions are changing from their original state to their image state.

## QUESTION 9: Transformation Geometry

### Common errors and misconceptions

- (a) This question was poorly answered by the vast majority of the candidates. The irrational coordinates used in this question proved to be challenging for many of them.
- (b) Many candidates were unable to differentiate between rotation in a clockwise direction and rotation in an anti-clockwise direction.
- (c) In 9.1, candidates used the anti-clockwise formula but with a positive angle  $\theta$ . A number of candidates were able to write down the correct equations but were unable to solve them simultaneously and hence could not determine that the reference angle was  $15^\circ$ . Some candidates used the anti-clockwise formula and arrived at  $\beta = 165^\circ$  but failed to continue that  $\theta = 360^\circ - 165^\circ = 195^\circ$ .
- (d) Some candidates arrived at  $\sin \theta$  equal to some positive value but went on to use the incorrect reduction formula in calculating the value of  $\theta$ . They used  $\theta = 180^\circ + 15^\circ = 195^\circ$ .
- (e) Many candidates were unable to solve 9.2 as it was unfamiliar. Many could not perform the basic calculations to determine the speed in revolutions per minute. Many candidates used the distance formula to calculate the length of TW. They then used this length in the formula:  $\text{Speed} = \frac{\text{Distance}}{\text{Time}}$ . They failed to realise that T has to move along the circumference of the wheel to reach W.

### Suggestions for improvement

- (a) Teachers should note that it is worth teaching learners to solve linear equations simultaneously by using the elimination method. It can prevent the need to make complex substitutions that lead to complicated manipulations.
- (b) Teachers can advise learners that direction and signs for rotation about the origin are consistent with that which they use in Trigonometry: anti-clockwise rotation about the origin results in a positive angle while clockwise rotation results in a negative angle.
- (c) Real life applications of Mathematics should be encouraged, starting in earlier grades.
- (d) Rotation about the origin through an angle is not in the Curriculum and Assessment Policy Statement and so is not examinable in the future.

## QUESTION 10: Trigonometry

### Common errors and misconceptions

- (a) This question was not well answered and indicates that candidates are not familiar with the basic concepts in Trigonometry.
- (b) Candidates chose to ignore the instruction that a calculator may not be used in this question.
- (c) While many candidates were able to calculate the value of  $r$  correctly, some indicated that the answer to  $r$  was negative. They did not recall that the value of  $r$  is always positive. There are still some candidates who do not understand that a trigonometric ratio is equal to a number. They wrote  $\cos \alpha = \cos\left(\frac{-12}{5}\right)$ .
- (d) Candidates had difficulty in applying the reduction formulae and compound angle expansion in 10.2 and 10.3.
- (e) In 10.2, some candidates made the following substitution:  $\tan(180^\circ - a) = \frac{\sin}{\cos}(180^\circ - a)$ . Other candidates applied the correct reduction formula for  $\tan(180^\circ - a)$  but then went on to make the following incorrect substitutions:  $\tan(180^\circ - \alpha) = -\tan\left(\frac{-12}{-5}\right)$  or  $\left(\frac{-12}{-5}\right)$  or  $\left(\frac{-12}{-5}\right)\alpha$ . The signs were often not logical. Many candidates ended up with a positive answer instead of a negative. This could possibly be on account of the sketch showing the angle in the third quadrant but not realising the question was about  $\tan(180^\circ - a)$  and not  $\tan a$ .
- (f) Many candidates were unable to provide the correct expansion for  $\sin(30^\circ - \alpha)$ . A fair number of candidates wrote  $\sin(30^\circ - \alpha)$  as  $\sin 30^\circ - \sin \alpha$ . Some candidates were confused between compound angle expansion and reduction formula and wrote  $\sin(30^\circ - \alpha)$  as  $-\sin \alpha$ .

### Suggestions for improvement

- (a) Learners should be reminded to follow the instructions regarding the use of the calculator.
- (b) Teachers should ensure that learners receive a good grounding in trigonometry in the earlier grades.
- (c) Teachers should constantly revise the basic ratios, reduction formulae and expansions.

## QUESTION 11: Trigonometry

### Common errors and misconceptions

- (a) Generally, many errors committed in 11.1 to 11.3 indicate a poor grounding in Trigonometry. Candidates could not recognise the reduction formulae and identities.
- (b) In 11.1, candidates were unable to simplify using reduction formulae. Many reduced  $\cos^2(\theta^\circ + q)$  to  $-\sin^2 q$ , thereby ignoring the fact that the square of a negative number is positive. Some candidates wrote  $\cos(-q)$  as  $-\cos q$ .
- (c) Candidates had difficulty with identities and struggled to determine the general solution of the equation. Many candidates replaced  $\tan x$  with  $\frac{\sin x}{\cos x}$  and could not proceed any further. Some were unable to factorise correctly. Some candidates divided throughout by  $\tan x$  or  $\cos x$  and thereby lost solutions. Some candidates were unable to simplify  $\sin x + \cos x = 0$  to  $\tan x = -1$ .
- (d) Candidates were unable to write out the correct notation for the general solution. Some wrote  $k \in R$  instead of  $k \in Z$ . Others wrote  $x = 135^\circ.k.180^\circ$  instead of  $x = 135^\circ + k.180^\circ$ .
- (e) In 11.3 and 11.4, candidates found the identities to be a challenge. In 11.3.1, some candidates expanded  $\sin^2 3x$  to  $\sin^2(2x + x)$ . This led to long and tedious calculations. The most common error was to replace  $\sin^2 x - \cos^2 x$  with  $\cos 2x$ . Many candidates were not clear how to simplify  $\sin^2 x - \cos^2 x$  to  $-1$ . In 11.3.2, candidates did not realise that the amplitude of the simplified expression was the required maximum value.
- (f) Many candidates were able to answer 11.4.1(a) but a number were unable to factorise  $\cos^2 x - \sin^2 x$  as  $(\cos x + \sin x)(\cos x - \sin x)$ . In 11.4.1(b), many candidates failed to identify the double angle, i.e. they could not simplify  $4 \sin x \cos x$  to  $2 \sin 2x$ . Some merely left their answer in terms of  $\alpha$ .
- (g) In 11.4.2, candidates were able to substitute correctly for the values of  $p$  and  $q$  but thereafter made errors during the simplification.

### Suggestions for improvement

- (a) Teachers should emphasise the importance of learning the basic theory in trigonometry. This knowledge is essential to the answering of the more complex questions.
- (b) Teachers should revise the trigonometry covered in Grades 10 and 11. A good idea is to regularly incorporate this work in classroom assessments.
- (c) Teachers should illustrate the meaning of the general solution graphically.
- (d) Learners should be made aware that it is not possible to divide an equation by a trigonometric ratio, as there is a possibility that one is dividing by zero. Division by zero yields a meaningless or undefined result.
- (e) Proving identities and solving equations are standard types of problems in trigonometry. There are also general techniques for certain types of problems in this regard. Teachers should make this clear and provide some typical examples for practice and revision.
- (f) Learners should be exposed to higher-order questions of this nature in the classroom situation in order for them to be able to cope with such questions under examination conditions.

## QUESTION 12: Trigonometric Functions

### Common errors and misconceptions

- (a) Many candidates were successful at drawing the graph of  $g(x) = \cos 2x$  but not many were able to draw the graph of  $f(x) = \tan x + 1$  correctly. Many candidates failed to realise that a vertical translation of 1 unit upwards applied on  $y = \tan x$  resulted in  $f$ . Candidates did not draw the asymptotes or the graph was not drawn over the entire domain.
- (b) Candidates were unable to state the period of the graph of  $g$  correctly. Some gave the domain as the answer. Candidates were unable to recall the effect of  $k$  on the graph. Other candidates confused period with amplitude.
- (c) Candidates were unable to describe the transformation in 12.3, with very few of them getting this answer correct. Candidates indicated that the graph made a horizontal shift of  $20^\circ$  to the left or  $10^\circ$  to the left. A fair number of candidates were unable to identify the reflection in the transformation.
- (d) Many candidates were unable to interpret  $f'(x)$  and hence did not answer this question. Candidates who were able to recognise this failed to write the required intervals correctly.

### Suggestions for improvement

- (a) Every question paper will test trigonometric functions in different formats. Sketching graphs, understanding the effects of the parameters and reading certain values and intervals are standard types of questions which learners should practise regularly.
- (b) Point by point plotting of graphs by using the table function on the calculator has limited application. Teachers are encouraged to promote intuitive understanding of functions. They should also integrate functions with transformations.
- (c) More attention must be given to the drawing of the tangent function with particular emphasis on the asymptotes and shape.
- (d) Teachers should make learners aware that the notation  $>0$  means a positive quantity.
- (e) Teachers need to integrate the notation of derivative with functions. The derivative describes how the graph is behaving at that point: the graph is increasing, decreasing or turning at that point.
- (f) Higher-order questions should be an integral part of classroom testing.

## QUESTION 13: Trigonometry

### Common errors and misconceptions

- (a) A number of candidates took the year 2 500 BC to mean that the length of BC was 2 500 metres.
- (b) Candidates were unfamiliar with the terms apex, face and base of the pyramid.
- (c) Generally, candidates struggled to visualise a three-dimensional object that is represented in two dimensions on paper. In this regard, candidates assumed that  $EF = 232,6$  metres or that  $EF = EA = 221,2$  metres or that  $EG = 188,16$  metres. Candidates confused  $\triangle EFG$  with  $\triangle EFB$ . Candidates were unable to identify which triangles in the diagram were right-angled.
- (d) Candidates were unable to select the correct formula to use in solving the question. Some candidates wrote down the formula incorrectly even though they were given on the information sheet.
- (e) Candidates displayed poor application of the cosine rule and many struggled to make  $\cos \hat{C}EB$  the subject. Some substituted incorrectly into the cosine formula.
- (f) Some candidates used the basic trigonometric ratios in non-right-angled triangles.

### Suggestions for improvement

- (a) When teaching the sine rule, cosine rule and area formula, teachers should not only focus on using these rules to solve triangles but also pay attention to the minimum conditions required for the use of each rule. Learners should be able to change the subject of the formula.
- (b) Visualising 3D objects poses a challenge to most learners. Initially, teachers are encouraged to illustrate examples by way of a model. Such models can be constructed by using sticks/straws and prestik (glue) or by cutting out the corner section of a cardboard box. These 3D models should then be decomposed into 2D shapes, namely triangles. In doing so, learners are creating a familiar situation in that they have solved triangles using the sine, cosine and area rules in Grade 11. With sufficient practice, learners should be able to develop this skill and overcome the challenges of dealing with 3D problems.



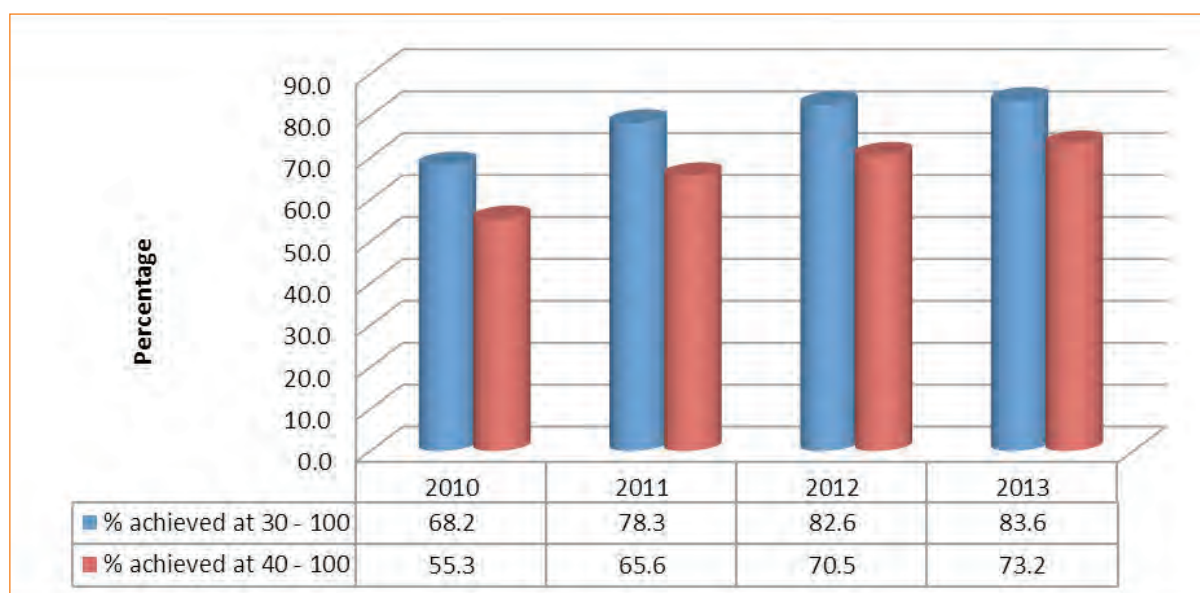
### 10.8 PERFORMANCE TRENDS (2010 – 2013)

There was 1% increase in the number of candidates who achieved at 30% and a 2.7% increase in the number of candidates who achieved at 40% and above in 2013 when compared to 2012.

**Table 10.8.1 Overall achievement rates in Mathematics Paper 3**

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
2010	9 454	6 451	68.2	5 230	55.3
2011	8 871	6 948	78.3	5 821	65.6
2012	8 878	7 337	82.6	6 263	70.5
2013	9 302	7 780	83.6	6 813	73.2

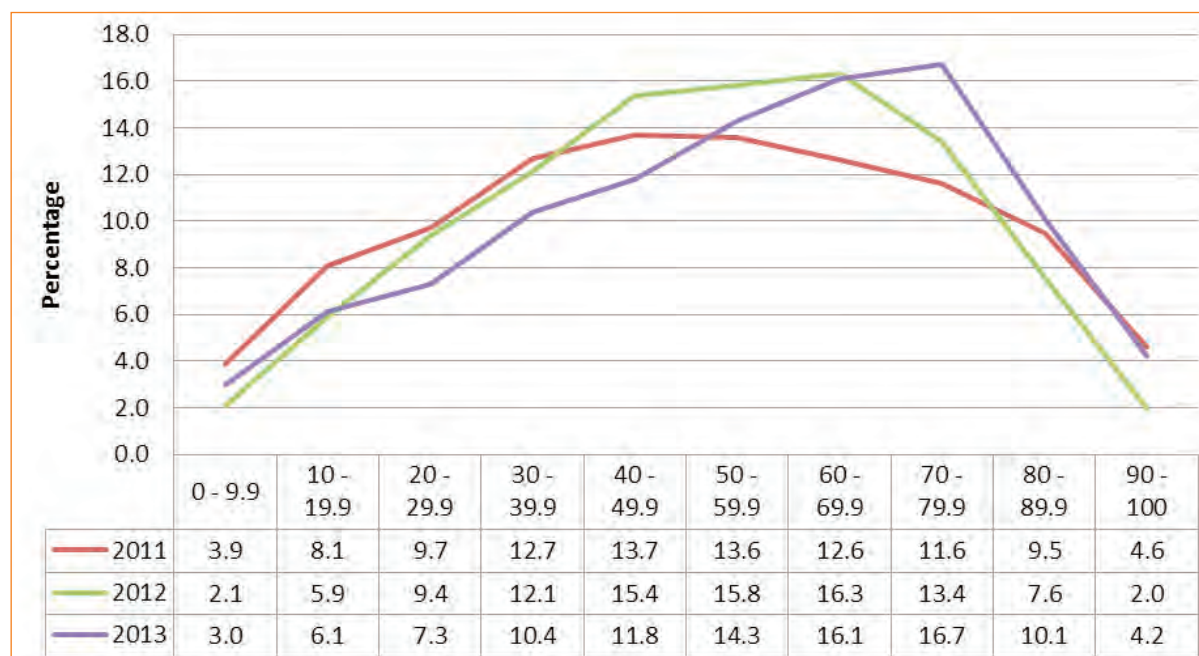
**Figure 10.8.1 Overall achievement rates in Mathematics Paper 3**



**Table 10.8.2 Overall achievement percentage rate per level in Mathematics Paper 3**

Year	0 - 9.9	10 - 19.9	20 - 29.9	30 - 39.9	40 - 49.9	50 - 59.9	60 - 69.9	70 - 79.9	80 - 89.9	90 - 100
2011	3.9	8.1	9.7	12.7	13.7	13.6	12.6	11.6	9.5	4.6
2012	2.1	5.9	9.4	12.1	15.4	15.8	16.3	13.4	7.6	2.0
2013	3.0	6.1	7.3	10.4	11.8	14.3	16.1	16.7	10.1	4.2

**Figure 10.8.2 Overall achievement percentage rate per level in Mathematics Paper 3**



## 10.9 OVERVIEW OF LEARNER PERFORMANCE IN PAPER 3

### General comments

- The overall performance of candidates has improved over the years. Candidates responded well to all cognitive levels tested. They managed to attempt the Euclidean Geometry, Similarity and the Counting Principles where in previous years it was not well answered or not answered at all.
- Teachers and learners must be commended for the extra effort that they make and the commitment shown in teaching this optional paper.
- It is encouraging to highlight some of the mistakes learners made as all learners offering Mathematics will now be writing most of the topics being offered in the optional paper.

## 10.10 DIAGNOSTIC QUESTION ANALYSIS FOR PAPER 3

### ANALYSIS OF LEARNER PERFORMANCE IN INDIVIDUAL QUESTIONS IN PAPER 3

#### QUESTION 1: Bivariate Data

Generally this question was well answered by most learners. It was the second best answered question in the whole paper.

#### Common errors and misconceptions

- Drawing the least squares regression line posed a problem. It was difficult to distinguish between the least squares regression line and the line of best fit. In question 1.3, some learners just estimated and drew the least squares regression line. Some learners perceived the “fitted model” as a person in question 1.

- (b) In Question 1.2, learners had to determine the equation of the least square regression line. This was very well answered. 99% of the learners knew how to use their calculator effectively instead of using the tedious method of the formula. Some learners were penalised for rounding, but the majority scored 4/4.

### Suggestions for improvement

- (a) In 1.3, learners need to be taught repeatedly on how to draw the line accurately. English teachers and Mathematics teachers should work collaboratively to enhance conceptual understanding and bridge the language barrier particularly for question 1.4. Learners must be reminded to first determine points from the equation of the least square regression line, clearly indicate and plot the points, and then draw the line. This will eradicate any confusion over a line of best fit (where no points are required) and a least squares regression line.
- (b) Learners should be able to comment on the strength of the relationship – the two key words that should be used to describe the correlation are **weak/strong & negative/positive**. Also make use of the real life example to explain.
- (c) Learners should know how to **use the calculator** to determine the values of a and b, as well as the correlation coefficient.

### QUESTION 2: Probability

The learners answered this question generally very well.

### Common errors and misconceptions

- (a) Learners were caught off guard with the name of the sampling method used, and did not know the answer, whereas some improvised by using the information given. Learners could not name the sampling method because they were unaware of the different methods of sampling that exist.
- (b) Many learners were unable to distinguish between a biased set of data and an unbiased set of data and how to choose a sample representative of the population.
- (c) Some learners did not have the basic knowledge of the terminology and couldn't explain/express themselves.

### Suggestions for improvement

- (a) Teachers and learners must be reminded that types of sampling methods are part and parcel of the syllabus and can expect to be tested on it.
- (b) Learners should practise these real life situations and problems so that they will be able to interpret/explain their answers better with the correct usage of terminology such as random/homogenous sample, etc. The content needs to be explained thoroughly so that learners can apply their mind when dealing with real life situations.

### QUESTION 3: Probability – Venn Diagram

Learners performed fairly well in this question giving an indication that the question was taught in class. However, the manner in which the events were represented on the Venn diagram was a challenge to interpret.

#### Common errors and misconceptions

- (a) Learners did not use the correct formulas for independent events. They were not sure when to use the word “or” or “and”. Terminology such as union and intersection were not correctly interpreted.
- (b) Some learners did not know what is the difference between the exclusive and inclusive events.
- (c) Learners can't answer YES/NO, while the question asked AGREE/DISAGREE. Then they have to motivate their answer with the correct reason in question 3.1.
- (d) Some of the learners wrongly used the complement-concept and its formula in questions 3.2.1 and 3.2.2.

#### Suggestions for improvement

- (a) The emphasis must be on the correct usage of formulas. Teach the learners the principles of events being – inclusive vs exclusive & independent.

**Mutually exclusive:  $P(A \text{ and } B) = 0$**

**Mutually inclusive:  $P(A \text{ and } B) \neq 0$**

**Independent :  $P(A \text{ and } B) = P(A) \times P(B)$**

For any two events A and B :  $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$ .

The concept of complement is also to be taken into consideration.

- (b) Probability outcomes are represented in all forms as a fraction, decimal form and percentage.

### QUESTION 4: Counting Principle

Learners managed to answer question 4.1 very well, but failed dismally in question 4.2.

#### Common errors and misconceptions

- (a) Learners did not really have any idea on what to do in Q4.2. They really lack of knowledge of permutations and combinations.
- (b) Some learners were not exactly clear as to what vowels and/or consonants are, hence making it difficult to answer the question.

#### Suggestions for improvement

- (a) The teaching of this topic, counting principle is highly needed. Teachers should use real life situations where people choose pin codes and passwords for accessing their documents or opening their cell phones. Also include examples where letters and/or digits being repeated and/or not being repeated. Explain the importance of obeying the instructions.
- (b) Learners need to know that there are 5 vowels, the total number of consonants, alphabets and digits. Basic knowledge is important in Mathematics as questions can be phrased in various ways and using different objects.
- (c) Teachers should expose learners to adequate amount of exercises to encourage practice and understanding.

### QUESTION 5: Statistics

This question was poorly answered.

#### Common errors and misconceptions

- (a) Many learners did not understand the definition of a Histogram (question 5.1) and thus could not link the frequency table with the Histogram. They subsequently struggled to pick up the mistake in the Histogram. The answer was compounded by the blackened diagram.
- (b) In question 5.2, learners could get on how to correct / rectify a histogram if the width of the bars of the histogram is not the same. Learners had to look at the ratio of the areas of the rectangles to the frequencies. This ratio had to be the same. In order to get the ratio the same the frequency of the first rectangle had to be adjusted from 10 to 5. Many students opted to split the width of 500 – 700 to 600 – 700 and split the frequencies 5 each. This is the incorrect method and 99% of the students could not answer this question successfully.

#### Suggestions for improvement

- (a) Teaching must include this situation where intervals can be of different width and thus consider the width in relation to the frequency (the area of the bar must be the same value as the frequency).
- (b) Teacher should always test learners on topics they learnt in lower grades as a way to revise some topics. This will enable learners to understand some concepts better.

### QUESTION 6: Probability- Venn Diagram

Question 6 was surprisingly well answered and many learners obtained a reasonable mark in this question.

#### Common errors and misconceptions

- (a) Learners did not know how to calculate the values to be put into the intersection of the events.
- (b) For Q6.2, a lot of learners did not earn the third mark by calculating the final answer (the probability that a teacher selected said that learners had **exactly two problems**).
- (c) The most crucial reason for those learners who performed poorly is conceptual understanding of Venn diagrams. For example in 6.1 Venn diagram involves A, P and N. If  $A = 890$ , then some candidates put 890 in one portion although 890 is representative of more than one portion.

#### Suggestions for improvement

- (a) Expose learners to questions that are asked in a different way. Learners should master Venn diagrams for three events before attempting Venn diagrams for three events. The terminology is mostly applied here like mutually exclusive events.
- (b) This question was being tested every year since 2008. Therefore, teachers should practice with learners on how to answer it. The question requires reasoning and manipulation of figures. Practice makes perfect.

## QUESTION 7: Statistics - Normal Distribution Curve

This question was answered well much better than previous years. Learners seem to interpret the standard deviation much better although 7.2 was poorly answered.

### Common errors and misconceptions

- (a) Some candidates did not use standard deviations to compare the Mathematics and English marks. (position from the mean was used instead) Some candidates used two scores but failed to interpret the values.
- (b) It is clear that some learners do not understand the meaning and use of standard deviation.

### Suggestions for improvement

- (a) Learners should understand the usage of the normal distribution graph to improve their interpretation of data. Teachers must review all concepts related to normal distribution curve. More questions based on graphical interpretation are required during informal and formal assessment.
- (b) Teachers must review concepts like mean, standard deviation ( $1\sigma$ ,  $2\sigma$ ,  $3\sigma$ ) and the correct usage of the percentages within these deviations.
- (c) Both grouped and ungrouped data exercises must be used to describe data distribution using information from box and whisker. Exercise with more real life situations and problems are needed.

## QUESTION 8: Recursive Sequences

Majority of learners answered this question very well.

### Common errors and misconceptions

- (a) Some learners did not use the subscript in the correct way:  $T_{n-1}$  was seen as  $T_n - 1$ .
- (b) Many learners did not recognize the quadratic pattern dealt with in Grade 11.

### Suggestions for improvement

- (a) Emphasise the difference between the recursive and the explicit formulae.
- (b) Teachers must expose learners to the correct techniques of generating recursive sequence and be part of formal and informal assessment.

### QUESTION 9: Euclidean Geometry – Ratio and Proportion

Geometry needs a lot of practice and systematic and accurate reasoning. Much effort must go into teaching and more practice using previous papers.

#### Common errors and misconceptions

- (a) Some learners do not understand the concept of “divide into the same proportion”:  $\frac{AB}{BC} = \frac{AF}{FE}$ . They came to the conclusion that  $AB = AF$  and  $BC = FE$ .
- (b) Some learners confuse the proportionality theorem with the midpoint theorem.
- (c) Many learners found it difficult to distinguish between a “ratio” and a “length”. Some candidates assumed that if the sides of a  $\Delta$  were divided in the same ratio, then the  $\Delta$  would be isosceles – which is a misconception.

#### Suggestions for improvement

- (a) Teachers must emphasise what is a “length” in a unit of measure and what is a “ratio” which can be split. e.g.  $\frac{ABAB}{BCBC} = \frac{22}{11}$ . Also ratios cannot be written with variables as an answer.
- (b) When teaching proportionality concepts, teachers are urged to use variables so as to distinguish between a “ratio” and a “length”.

### QUESTION 10: Euclidean Geometry - Circles

This question was very well answered with a very high percentage for a Euclidean Geometry question.

#### Common errors and misconceptions

- (a) Some learners do not understand or know theorems and their applications. A common misconception is that any quadrilateral is treated as a cyclic quadrilateral.
- (b) Some learners were not prepared for the Euclidean Geometry and lacked the bare basics.

#### Suggestions for improvement

- (a) Learners must analyse the question on the diagram before writing out the solution. When learners are given riders PLEASE number all the angles. Using the 3 letter numbering makes DOING the riders and marking it very difficult.
- (b) Reason for each statement must be taught with the use of related diagram to ensure clearer and more accurate/identification of application of theorems.
- (c) Teachers must ensure that learners are confidently able to identify naming of lines and angles.
- (d) Solutions must be written out as concise as possible.
- (e) Answers in geometry must be guided by mark allocation in the question paper.

### QUESTION 11: Euclidean Geometry - Circles

This was a book work question. Although many learners and teachers were caught by surprise, many students were able to obtain some marks from the proof, based on common knowledge and application. Very few students left this question blank.

#### Common errors and misconceptions

- (a) Learners did not learn this as a theorem. They do not know how to prove congruency i.e. state  $\Delta$ 's, then appropriate properties; then conclusion.
- (b) It shows that learners do not know how to apply congruency conditions  $90^\circ$ , Hyp; Side.

#### Suggestions for improvement

- (a) When dealing with congruency, learners must be taught to differentiate between RHS and when you only have one angle. It must be an "included" angle.
- (b) Teachers should include one question which requires bookwork testing theorem.

### QUESTION 12: Euclidean Geometry - Circles

This question was not well answered by the majority of learners.

#### Common errors and misconceptions

- (a) Circle geometry and similarity were combined in this question. Again when learners had difficulty here, they made assumptions that were not proven. Therefore, they did not get marks. Majority of the learners did very well in this question.
- (b) The response to this question 12.2 was hampered by the students assuming that one of the angles is equal to ninety degrees. Many learners got zero in 12.2.

#### Suggestions for improvement

- (a) Let learners talk about proofs, reasons and assumptions out loud, and have others in class listen for circular arguments or thinking that is not logical. Geometric reasoning is a skill which is acquired only after enough practice and exposure.
- (b) Theorems MUST be studied thoroughly.



## MATHEMATICAL LITERACY

The following report should be read in conjunction with the Mathematical Literacy question papers of the November 2013 Examination.

### 11.1 PERFORMANCE TRENDS (2010 – 2013)

The trend in Mathematical Literacy has been one of gradual improvement in the numbers passing which is a recovery from the 2010 pass rate. The quality of passes is increasing at an encouraging rate. The percentage performance at 30% remained unchanged between 2012 but in 2013 more learners (28 110) passed due to the larger cohort who wrote the examination. The pass rate at 40% and above has increased marginally by 1% from 2012 to 2013.

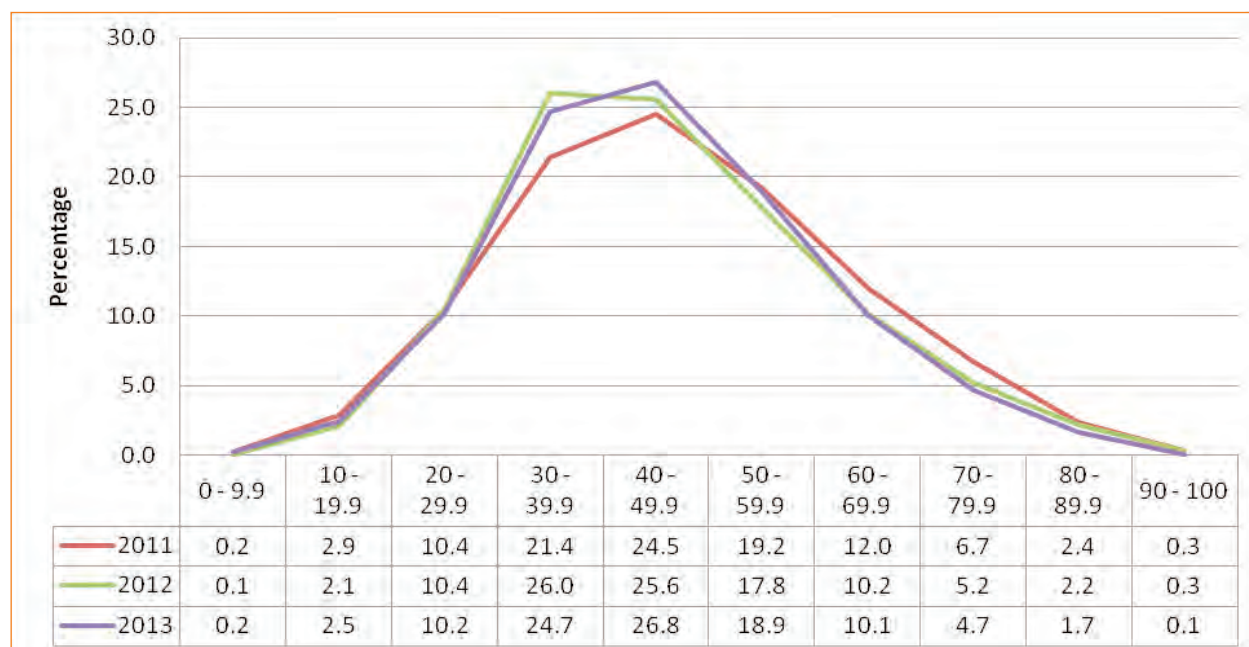
**Table 11.1.1 Overall Achievement Rates in Mathematical Literacy from 2010 – 2013**

Year	No. Wrote	No. achieved at 30% and above	No. achieved at 30% and above	No. achieved at 40% and above	% achieved at 40% and above
2010	280 836	241 576	86.0	181 794	64.7
2011	275 380	236 548	85.9	178 899	65.0
2012	290 713	254 083	87.4	178 498	61.4
2013	324 097	282 270	87.1	202 291	62.4

**Figure 11.1.1 Overall achievement in Mathematical Literacy (2010 – 2013)**



Figure 11.1.2 Performance distribution curves in Mathematical Literacy (2011 – 2013)



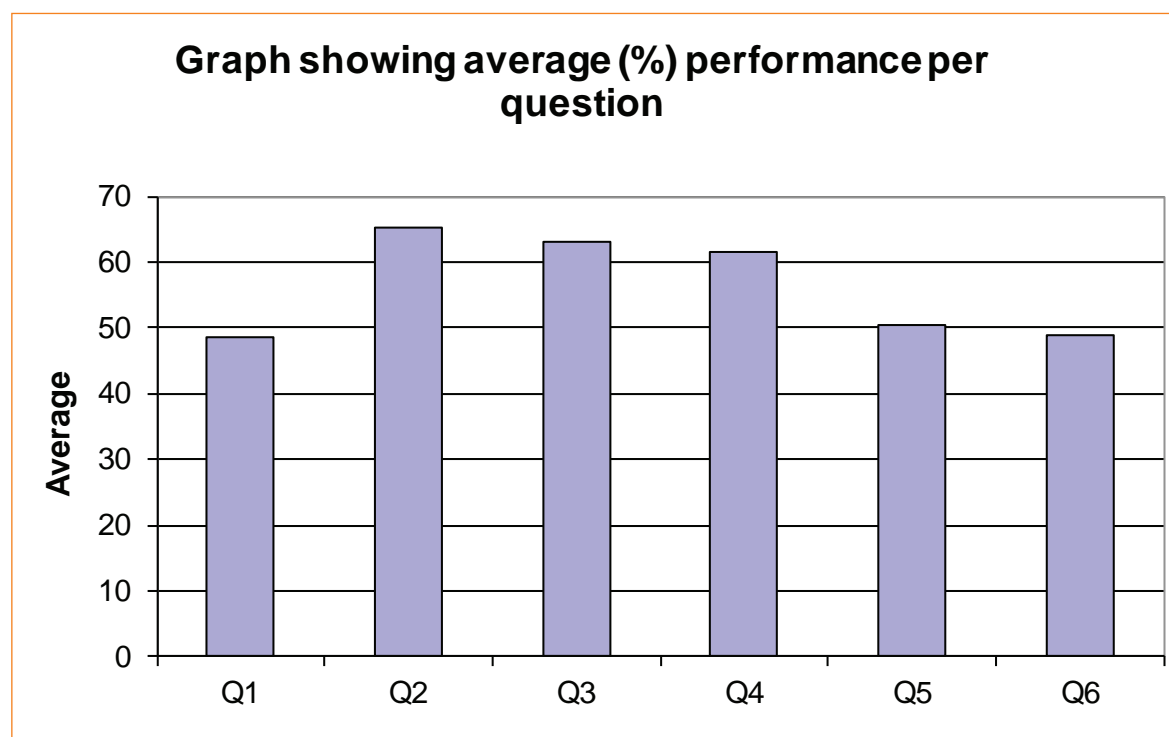
## 11.2 OVERVIEW OF LEARNER PERFORMANCE IN PAPER I

### General comments

- (a) The number of candidates passing at the 50% and above level is similar to that recorded in the past.
- (b) There is a small decrease in the number of candidates obtaining 80% to 100%, and in the number of candidates obtaining 70% to 79%.
- (c) However, a larger number of candidates has obtained 40% to 59%. This could be because learners and teachers are becoming more familiar with the content of Mathematical Literacy.

## 11.3 DIAGNOSTIC QUESTION ANALYSIS FOR PAPER 1

Figure 11.3.1 Average percentage performance per question for Paper 1



Question	Content	Average %
Q1	BODMAS; Rate; Ratio; Substitution; Discount; VAT	48.6
Q2	Perimeter, Area and Patterns; Statistics; Inverse graph	65.1
Q3	Area; Volume; Temperature Conversion; Equation; Profit and Loss	63.0
Q4	Analysis of Safety statistics	61.6
Q5	Graph of Bacteria Growth and a laboratory layout	50.5
Q6	Pie Chart; Analysis of Data related to School Jerseys; Linear Graphs	48.9

## 11.4 ANALYSIS OF LEARNER PERFORMANCE IN INDIVIDUAL QUESTIONS IN PAPER I

### QUESTION 1: Shorter questions (BODMAS; Rate; Ratio; Substitution; Discount; VAT)

The performance of learners in this question ranged from good to poor with an average of 48,6%.

#### Common errors and misconceptions

- (a) Candidates were unable to apply BODMAS correctly.
- (b) Candidates could not convert millions to numbers. Candidates omitted the unit in the answer. Candidates generally subtracted 950 000 from 1,02 million without changing one of the two numbers to the same format; i.e. 1,02 million becomes 1 020 000 or 950 000 becomes 0,95 million.
- (c) Candidates could not convert 2,83 hours into minutes.
- (d) The candidates did not know how to work with ratio and proportion. They subtracted from 288, etc. Ratio-calculation was misinterpreted.
- (e) Candidates were confused about the term 'maximum'.
- (f) Rounding down was problematic.
- (g) Candidates were unable to reverse the calculation of VAT.

#### Suggestions for improvement

- (a) Different calculators and calculator skills need to be taught to candidates.
- (b) More classroom and homework exercises are needed in conversion (million to numbers).
- (c) Learners need more practice on when to round up and when to round down, depending on the context.
- (d) Teachers must ensure that learners have a good concept of numbers, whether written in numerals or in words.
- (e) Candidates misunderstood indirect proportion. Learners need more practice in using proportion and ratios.
- (f) Learners must be provided with a variety of rearranged formulae for substitution and calculation so that they get used to working with 'different' formulae.
- (g) Learners should be taught the following step-by-step approach to answering multistep questions:
  - Write down the given information;
  - Identify the problem;
  - Identify which aspects of the given information are relevant to solve the problem; and
  - Write down the first step necessary to work towards solving the problem.
- (h) More exercises concerning percentage increase and decrease must be practised.

- (i) There should be more exercises in calculating VAT inclusive and exclusive.
- (j) Teachers must ensure that all schools have copies (old if need be) of bus and train timetables so that they can be used for exercises in the classroom.

### **QUESTION 2: Perimeter, Area and Patterns; Statistics; Inverse graph**

The performance of learners in this question was good, with an average of 65.1%.

#### **Common errors and misconceptions**

- (a) Candidates confused radius and diameter.
- (b) Candidates confused mean and median.
- (c) Candidates are not used to working with depreciation and thus replaced the minus sign in the formula with a plus sign.
- (d) Candidates could not formulate a formula.
- (e) The word modulus confused 25% of the sampled learners.
- (f) The majority of learners are unable to interpret from a graph whether they were dealing with inverse or direct proportion.

#### **Suggestions for improvement**

- (a) Learners need to be exposed to shapes in different concepts by cutting them out and putting them together so that they can see the shape as a complete unit.
- (b) Teachers should emphasize the difference between radius and diameter.
- (c) Learners must be exposed to working with shapes in different forms.
- (d) Learners must practise doing calculations with different substitutions in different formulae.
- (e) Teachers should clarify the concept of ascending and descending order.
- (f) Learners must know the different concepts of mean, median, mode.
- (g) Revise Grade 10 and 11 concepts (Inverse / Indirect).
- (h) Learners must be given more practice in the formulation of formulae.
- (i) Learners should be given more information in diagram form to interpret.

### QUESTION 3: Area; Volume; Temperature Conversion; Equation; Profit and Loss

The question was fairly well-answered with an average of 63.0%.

#### Common errors and misconceptions

- (a) Some candidates substituted correctly but did not apply BODMAS correctly.
- (b) Candidates worked with compound interest and started dividing and multiplying accordingly, leading to the wrong answer.
- (c) Some candidates could not calculate profit.
- (d) Some candidates could not decrease a percentage.

#### Suggestions for improvement

- (a) Applying BODMAS and calculator skills should be emphasized for learners.
- (b) Learners need to be exposed to rounding down and rounding up in different contexts.
- (c) The concept of profit must be tested regularly, even though it is in the grade 10 content.
- (d) Teachers can use advertisements for retail stores as resources for extra exercises in calculating discounts.

### QUESTION 4: Analysis of Safety Statistics

Learners' performances in this question was good, with an average of 61.6%.

#### Common errors and misconceptions

- (a) Candidates could not write the answer in ratio form.
- (b) A few candidates gave more than one province.
- (c) Candidates confused general directions.
- (d) Candidates could not calculate the scale of the map.

#### Suggestions for improvement

- (a) Learners need to be exposed to word problems.
- (b) Learners need to be exposed to writing and using ratios and how to simplify them.
- (c) Learners need to be exposed to categories/intervals on maps.
- (d) Teachers should teach ample examples of general directions.
- (e) Learners need to be exposed to different ways of calculating scales, especially bar scales where learners have to measure the bar.

## QUESTION 5: Graph of Bacteria Growth and a Laboratory Layout

Learners' performances in this question was poor, with an average of 50.5%.

### Common errors and misconceptions

- (a) Candidates failed to recognize the break in the sequence/pattern. They mistook **K** as the value of 10 instead of 12.
- (b) Candidates did not know they could read or do a calculation from the graph.
- (c) Candidates failed to properly interpret the question and could not read the values from the table.
- (d) Candidates failed to identify the correct information from the plan.
- (e) Candidates lost 1 mark by not writing the correct unit.
- (f) Some candidates could not differentiate between the distance on the plan and the actual distance.
- (g) Expressing the appropriate unit was also problematic.

### Suggestions for improvement

- (a) Learners need to do more drill work regarding reading information from tables.
- (b) Learners must do remedial work on map work and analysis of symbols on building plans, relative position and compass direction.
- (c) Learners need to do exercises on navigating on plans and maps, using appropriate descriptors e.g. 'left' and 'right', instead of 'up' and 'down'.
- (d) Learners need to do drill work regarding units.
- (e) Learners need to be exposed to conversions between different units of measurement rounding.

## QUESTION 6: Pie Chart; Analysis of Data related to School Jerseys; Linear Graphs

Learners scored either very well or poorly, with an average of 48.9%

### Common errors and misconceptions

- (a) Some candidates did not subtract from 100%. They just added the other segments.
- (b) Candidates did not interpret the key correctly.
- (c) Candidates added the 60 and the 40 to give 100 or they divided 600 by 6. They guessed the answer. They knew the answer but were unable to write down how it was calculated.
- (d) Candidates did not know that they could draw the graph using only the first and last values.
- (e) Candidates could not read information off the graph.

### Suggestions for improvement

- (a) Learners need to be exposed to the difference between percentage (100%) and revolution ( $360^\circ$ ) when using a pie chart.
- (b) Learners need to be exposed to graphs and key interpretation in context.
- (c) Learners need to be exposed to exercises on how to calculate values on a table.
- (d) Learners must be given enough practice regarding plotting of points on a system of axes.
- (e) Learners need to be taught how to determine the break-even point.

## 11.5 OVERVIEW OF LEARNER PERFORMANCE IN PAPER 2

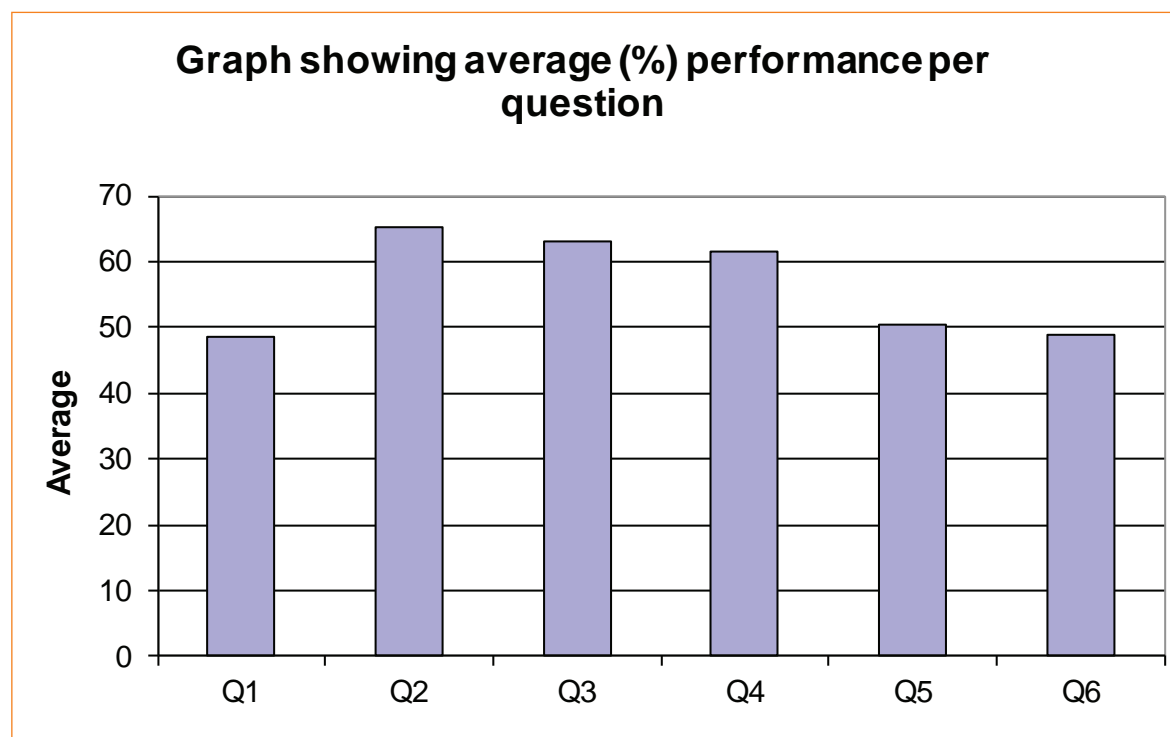
### General comments

- (a) The performance of candidates is similar to that recorded in the past.
- (b) There is a small decrease in the number of candidates obtaining 80% to 100%, and in the number of candidates obtaining 70% to 79%.
- (c) However, a larger number of candidates have obtained 40% to 59%. This could be because learners and teachers are becoming more familiar with the content of Mathematical Literacy.



## 11.6 ANALYSIS OF LEARNER PERFORMANCE IN INDIVIDUAL QUESTIONS IN PAPER 2

Figure 11.6.1 Average percentage performance per question



Question	Content	Average %
Q1	Ratios; Areas and Volumes and Packaging	39.3
Q2	Equations, Analysis of Tables, Savings and Taxation	36.8
Q3	Census 2011 and levels of education analysis	40.0
Q4	Analysis of the shape of the Post box and post- delivery cost analysis and map work	33.4
Q5	Interpretation of Driving School Costs	30.5

## 11.7 ANALYSIS OF LEARNER PERFORMANCE IN INDIVIDUAL QUESTIONS IN PAPER 2

### QUESTION 1: Ratio; Area and Volume and Packaging

This question was fairly well answered by learners who could interpret maps and tables. The average percentage for the paper was 39.3%.

#### Common errors and misconceptions

- (a) Very few candidates managed to find the radius from the given diameter.
- (b) Some candidates multiply – for example,  $2,3 \times 400 = 920$  – instead of dividing  $400/2,5$ .
- (c) Some candidates changed the given formula from  $\frac{4}{3}$  to  $\frac{3}{4}$ , and also changed cube to square.
- (d) Some of the candidates who were able to substitute the correct radius could not get the correct answer, owing to their inability to operate their calculators.
- (e) Candidates could not convert from inches to centimetres or compare inches and centimetres.
- (f) Candidates could not interpret calculated answers logically in relation to the problem.

#### Suggestions for improvement

- (a) Learners must be given assignments and investigations which have all types of conversions.
- (b) All the different types of rounding should be practised, and learners must be able to tell from a context what type of rounding is appropriate.
- (c) The difference between a diameter and a radius should be emphasized.
- (d) Candidates should be made aware that the formula cannot be changed.
- (e) Teachers must show the learners how the calculator works, especially squaring and cubing.
- (f) The difference between the thousand separators (comma) and the comma on some scientific calculators should be emphasised.
- (g) Charts of unit conversions should be placed in the classrooms.
- (h) Candidates should always read the questions carefully and ensure that they give answers as per instruction.

## QUESTION 2: Equations, Analysis of Tables, Savings and Taxation

On the whole, learners' performances in this question were very weak. The average scored for this question was 36.8%.

### Common errors and misconceptions

- (a) Candidates struggled to identify the correct fuel tariff and used the incorrect rate / tariff.
- (b) Some candidates added the petrol cost (1,013) to the maintenance cost. They didn't multiply the kilometres per month with the tariff (1,013).
- (c) Tariffs were given in cents and not in rand; candidates were not able to convert to rand.
- (d) Candidates added the 1,317 to the maintenance instead of multiplying it by the distance in km.
- (e) Candidates were unable to compare the two answers of OCT and NOV. They also failed to incorporate the answer to 2.2.1 for OCT.
- (f) Candidates were able to calculate the remaining amounts for both months, but then they did not subtract to get the difference between the remaining amounts.
- (g) Candidates did not change 9% to 0,09. They used  $\frac{9}{12}$  instead of  $\frac{0,09}{12}$ .
- (h) Some of the candidates failed to change 2 years to 24 months, as the interest was compounded monthly.
- (i) Candidates found it difficult to calculate the difference between 315054 and 250 000 or would only subtract one of the rebates where they should subtract both rebates.
- (j) Candidates subtracted the rebate before they calculated the tax.
- (k) Candidates did not understand the concept of rebate and added it to the taxable amount.

### Suggestions for improvement

- (a) Application of the knowledge should be emphasised rather than mere repetition of knowledge, especially when dealing with formulae. Learners should not only use the formulae, but write them.
- (b) Conversions must be emphasized: cents into rand.
- (c) Multistep questions to be drilled.
- (d) Tax to be reviewed as well as the BODMAS.
- (e) Use of percentage in a formula (many used  $\frac{9}{1}$  instead of  $\frac{9\%}{1}$ ).
- (f) Rounding off of tariffs should only take place only in the final answers.
- (g) Learners need to be given sufficient revision in constructing formulas for different scenarios.

### QUESTION 3: Census 2011 and levels of education analysis

This question was challenging for almost all of the candidates. The average percentage performance in this question was 40.0%.

#### Common errors and misconceptions

- (a) Candidates misunderstood the question and therefore answered it only partially. They focused more on the percentages, rather than calculating the totals for the various years.
- (b) Candidates calculated the total learners (20 years and older) but then could not work out the rest of the question. They also rounded up instead of rounding down; some did not round at all.
- (c) Probability is still a remote concept to candidates. They wrote their answers as a ratio instead of a fraction.
- (d) Candidates did not understand the language and the 'trend' concept. They were also not specific in their answers and as a result they scored only some of the marks. The question was not difficult, but language ability is a problem.
- (e) Candidates did not arrange the data in ascending order and some wrote the value instead of the province. They did not read the question correctly.
- (f) Some candidates did not understand the characteristics of the pie diagram and the histogram and thus could not explain why the graphs could not be used.
- (g) Some candidates were not able to plot the points correctly because they could not interpret the scale on a vertical axis.

#### Suggestions for improvement

- (a) Classroom assignments should include working with big numbers like those in the millions.
- (b) Reverse percentage calculation should be practiced in different contexts, e.g. 59.3% of a population is 30 915 706: find the total population.
- (c) Learners should also be taught under which circumstances a particular graph is required.
- (d) Ensure that when learners work with scale, as many ways as possible are included in assignments.
- (e) Teachers should teach candidates to work with the scale which will be suitable for the data.
- (f) Accurate measuring of distances is a skill that must be practiced.
- (g) Learners must be aware that measuring the distance between two points is done from the centre of the one dot to the centre of the next.
- (h) Candidates should be taught to answer/interpret question in relation to the given context.

#### QUESTION 4: Analysis of the shape of the Post Box and Post Delivery Cost Analysis and Mapwork

This question was challenging for almost all of the candidates. The average percentage performance in this question was 33.4%.

##### Common errors and misconceptions

- (a) Candidates did not convert values to the same unit.
- (b) In Question 4.2.1, candidates struggled with formulating a formula.
- (c) In order to convert the answer which was already in square millimetres to square metres, some candidates divided by 1 000 instead of dividing by  $(1\ 000)^2(1\ 000)^2 = 1\ 000\ 000$ .
- (d) Candidates could not justify when comparing the newspaper with the newspaper opening.
- (e) Candidates used incorrect formulae but correct calculations when calculating / determining values of A and B.
- (f) Candidates did not indicate the first plotted point with an open circle.

##### Suggestions for improvement

- (a) Similar types of regular shapes must be included in classroom activities to expose learners to them. Net calculation for all shapes needs to be thoroughly taught and practised.
- (b) Candidates should be taught that the circle does not have sides; rather, the circumference of the circle is actually the perimeter of the circle.
- (c) Candidates should be encouraged to always work with values of the same units.
- (d) Following instructions on a given map or diagram will become increasingly important next year in CAPS — teachers need to ensure that learners know how to handle it.
- (e) Candidates must be taught how to use the calculator correctly.
- (f) Learners must engage with more problems to do with various calculator skills.
- (g) Most candidates thought that graphs should start at point (0:0), which is not always the case; hence they failed to draw the graph of this question correctly.

## QUESTION 5: Interpretation of Driving School Costs

This question was very challenging for almost all of the candidates. The average percentage performance in this question was 30.5%.

### Common errors and misconceptions

- (a) Graph interpretation was a challenge for candidates.
- (b) Candidates did not notice that the months were not in chronological order.
- (c) Candidates failed to describe the horizontal line as representing a flat or fixed rate.
- (d) A few candidates were unable to identify the minimum and the maximum values from the graph based on the data.
- (e) Candidates referred to the amount of money instead of time.
- (f) Most candidates were unable to describe in detail the cost of driving lessons if option B was used.
- (g) Most candidates identified point Q as the break-even point without citing an explanation.
- (h) Calculations were not neatly set out.

### Suggestions for improvement

- (a) Learners need to be exposed to examples where two or more graphs are drawn on the same set of axes and the learners are required to interpret the graphs and answer questions on them.
- (b) Learners need to be exposed to numerous activities which entail misleading graphs.
- (c) Candidates should be taught to use examples whenever they interpret graphs.
- (d) Educators must teach learners to set out answers methodically.
- (e) Candidates should be provided with activities that require them to develop their own formulae and draw graphs.
- (f) The teachers should teach the candidates always to refer to the context when explaining the break-even point. In this instance, the correct answer at point Q should have reflected the explanation for the cost and time pertaining to both options.

## PHYSICAL SCIENCES

The following report must be read in conjunction with Physical Sciences question papers of the November 2013 Examination.

### 12.1 PERFORMANCE TRENDS (2010 – 2013)

There has been a significant improvement in the performance of learners from 2010 to 2013. In 2013, at 30% and above level, there was a 6.1 percentage point improvement on figures for 2012. At the 40% and above level there was a 3.6 percentage point improvement with strong growth in the numbers who achieved at the 40% level (around 8 600) and at the 30% level (around 15 000) when compared with 2012 figures. The number of learners writing Physical Sciences increased by 2.9% in 2013.

**Table 12.1.1: Overall achievement rates in Physical Sciences**

Year	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
2010	205 364	98 260	47.8%	60 917	29.7%
2011	180 585	96 441	53.4%	61 109	33.8%
2012	179 194	109 918	61.3%	70 076	39.1%
2013	184 383	124 206	67.4%	78 677	42.7%

**Figure 12.1.1: Overall achievement rates in Physical Sciences**

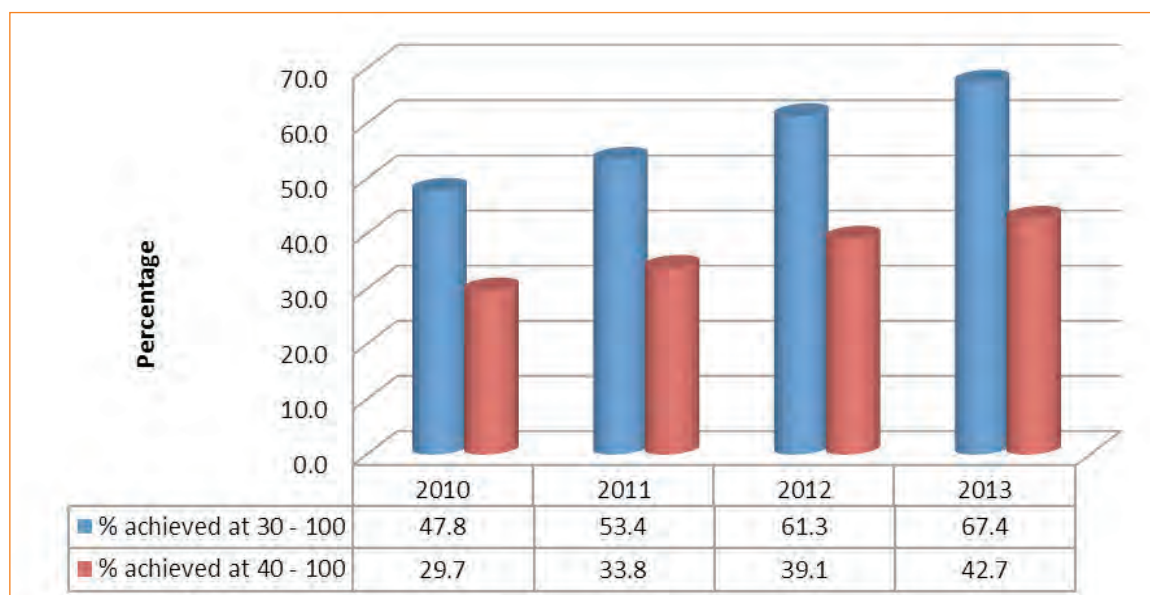
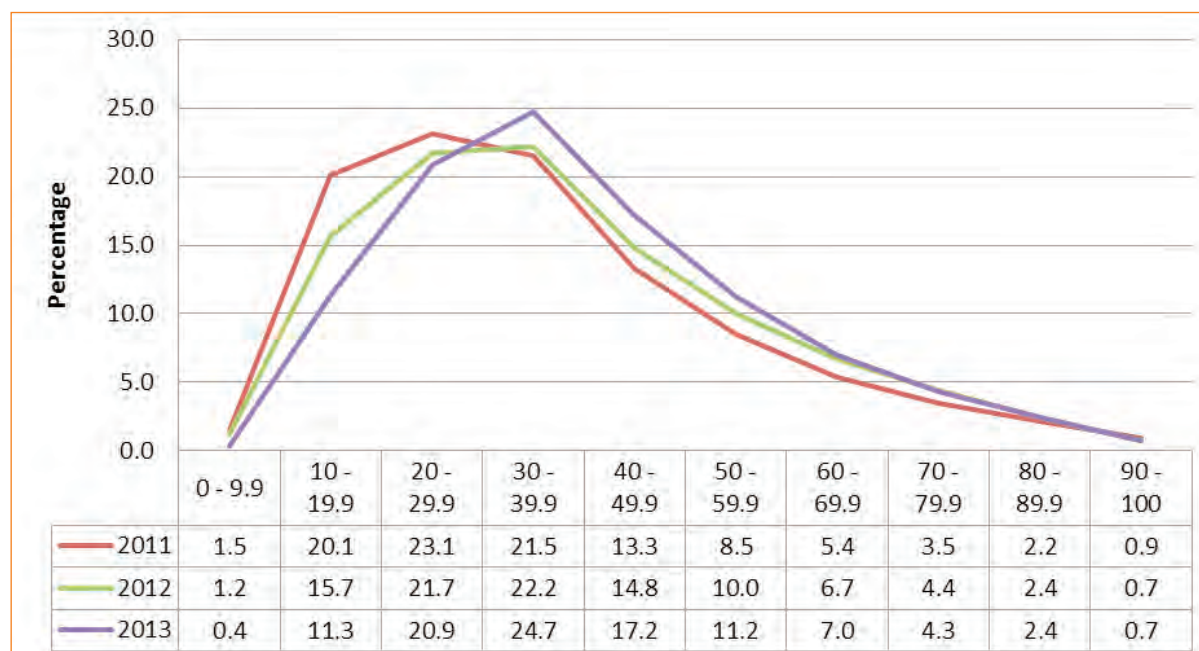


Figure 12.1.2: Performance distribution curves for Physical Sciences (2011 – 2013)



Compared to the 2012 performance, in 2013 there was a decrease in the number of candidates who performed at the 0 – 29% level, and an increase at levels 30 – 60%.

## 12.2 OVERVIEW OF LEARNER PERFORMANCE IN PAPER I

### General Comments

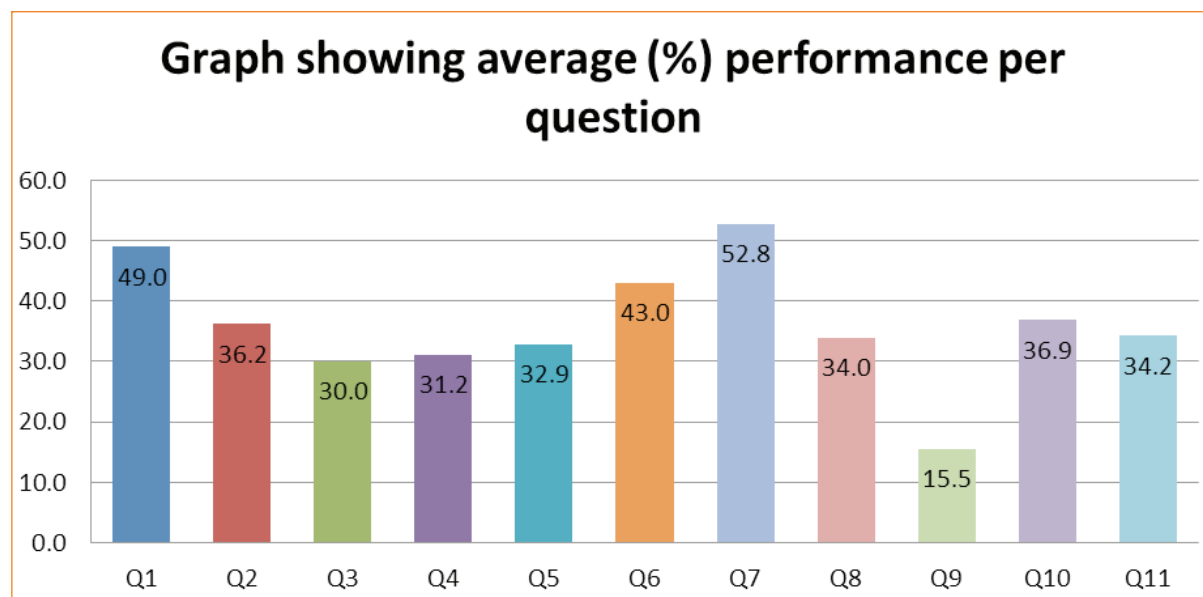
- There was a general improvement in the performance of candidates in Physical Sciences P1. More candidates achieved above 30%.
- In general, recall type questions were not well answered. This is an indication that candidates are not learning basic terms, laws, principles and definitions.
- Many candidates, including A candidates, could not express themselves clearly in questions that required an explanation. Higher order questions were therefore poorly answered.
- Poor graph reading skills and sketch graphs in Question 3 (projectile motion) were once again a problem to many candidates.
- The use of the Work-Energy Theorem (Q5), as in previous years, is still presenting a challenge to many candidates.
- Electric Circuits (Q9) was the worst answered question. Candidates failed to calculate the main current and the equivalent resistance of the circuit.
- The failure to comprehend and analyse the problem contributed largely to the poor performance of the weaker candidates.
- There was evidence of poor mathematical skills and poor use of calculators contributing to the poor performance of some candidates.



## 12.3 DIAGNOSTIC QUESTION ANALYSIS FOR PAPER I

A sample of scripts from each province revealed the following average percentages on each question.

**Figure 12.3.1: Average marks in each question expressed as a percentage (Paper 1)**



Question	Content	Average Performance (%)
Q1	One-word items – all topics	49.0
Q2	Multiple choice questions – all topics	36.2
Q3	Vertical projectile motion	30.0
Q4	Momentum	31.2
Q5	Work, energy and power	32.9
Q6	Doppler effect	43.0
Q7	2D and 3D wave motion	52.8
Q8	Electrostatics	34.0
Q9	Electric circuits	15.5
Q10	Motors, generators & alternating current	36.9
Q11	Photo-electric effect	34.2

## 12.4 ANALYSIS OF LEARNER PERFORMANCE IN INDIVIDUAL QUESTIONS IN PAPER I

### QUESTION 1: One-word Items

#### Common errors and misconceptions

- (a) Q1.1 assessed one of the most basic concepts in motion studied in Grade 10. The most common incorrect answers were 'displacement' and 'impulse'. This is an indication that candidates do not understand the basic concepts.
- (b) Most of the candidates who answered Q1.2 lacked basic knowledge on waves. Common incorrect answers were: wave front, frequency, and superposition.
- (c) Although Q1.3 was generally well answered, many candidates answered 'magnetic field' or 'electromagnetic field' instead of 'electric field'.
- (d) Many candidates answered this question incorrectly. The most common wrong answers were 'X-rays' or 'ultraviolet rays' instead of 'gamma rays'.
- (e) The majority of candidates who answered this sub-question confused work function with threshold frequency.

#### Suggestions for improvement

- (a) Teachers should ensure that learners know and understand the meaning and definition of concepts such as displacement, velocity and acceleration when teaching motion. The concepts of "change" and "rate of change" need to be clearly differentiated. In addition, a proper understanding of waves is impossible if learners do not know the definitions of concepts such as frequency and wavelength.
- (b) The only way to ensure that learners study the basics is through frequent informal testing. This should be done on a daily basis – sometimes orally and sometimes as short tests that can be written in homework books and marked by the learners themselves. Learning of such terms comes about through regular repetition. Regular written work and regular testing of these concepts will ensure that learners study these concepts.
- (c) A list of correct definitions, principles and laws should be made available to all schools and should also be given to each learner and also displayed prominently in classrooms. The drill method should be used to reinforce knowledge of basic concepts, definitions, principles and laws. Learners should be given a list of terms or definitions at the end of each section. These definitions could also be displayed in the classroom.
- (d) During revision of grade 12 work teachers need to ensure they allocate time to revise and clarify basic concepts from grades 10 - 12 instead of focusing on calculations only.
- (e) Teachers should emphasise correct spelling of scientific terms in class.

## QUESTION 2: Multiple Choice Questions

### Common errors and misconceptions

- (a) In Q2.1, the most common incorrect answer was A. i.e. work done is equal to force x velocity.
- (b) In Q2.2, the most common incorrect answer was D.
- (c) Q2.3 was poorly answered because learners could not determine the direction of the net force and hence thought that kinetic energy increases in the easterly direction (D).
- (d) In Q2.4, the most common incorrect answer was B. Some gave C as the answer. Through elimination learners could have easily obtained the correct answer.
- (e) In Q2.5, the most common incorrect answer was D. Candidates did not know the basic definition of the terms listed as options.
- (f) In Q2.6, the poor performance in this question points to the lack of basic knowledge on capacitors. Candidates could not identify the paper as a dielectric and hence did not know the function of the paper.
- (g) Q2.7 was the worst answered multiple choice question. The most common incorrect answer was C. Candidates' knowledge on mathematical relationships between physical quantities is poor. Power is directly proportional to the square of the current and not the current. When interpreting graphs learners need to understand how to write a proportionality when given an equation and vice-versa. They also need to understand how a proportionality constant is determined and what it means. In this question the equation  $P = I^2R$  can be used. Since the graph was taken for a "given ohmic conductor", it means that the resistance is constant. Hence the equation  $P = I^2R$  will mean that P is directly proportional to  $I^2$  when R is constant.
- (h) The most common incorrect answer was C in Q2.8. Not many candidates chose the correct answer. Candidates needed to understand the equation  $E = hf$  and electromagnetic spectrum.
- (i) The most common incorrect answer was C in Q2.9. Candidates could not apply Fleming's left hand motor rule to determine the force experienced by the conductor.
- (j) In Q2.10, the most common incorrect answer was A.

### Suggestions for improvement

- (a) Learners must be exposed to multiple choice questions in class tests, homework, class work and controlled tests.
- (b) Teachers must select multiple choice question from past National and Provincial grade 12 examination question papers.
- (c) Teachers must develop skills in the answering of multiple choice questions. In cases where the answer is not immediately obvious, learners should go through steps of eliminating obviously incorrect answers. One easy way to determine an incorrect answer is to check if the unit is correct or not, e.g. in question 2.1 the unit obtained when multiplying *force* and *velocity* is  $\text{J}\cdot\text{s}^{-1}(\text{N}\cdot\text{m}\cdot\text{s}^{-1})$ . The unit for work is N·m. Hence option one cannot be correct.
- (d) As suggested last year, interpretation of graphs must be a priority during teaching. Graphs are important tools to present information in science. Teachers should make an effort to teach the use and interpretation of graphs and never assume that every learner is familiar with graphs. Teachers should include the interpretation and drawing of straight line graphs, parabola and hyperbola in all the knowledge areas in Physics

### QUESTION 3: Vertical Projectile motion

#### Common errors and misconceptions

- (a) In Q3.1, although most learners gave the correct answer, there were candidates who could not interpret the graph.
- (b) In Q3.2, candidates were unable to differentiate between elastic collisions and inelastic collisions. Learners failed to use the fact that kinetic energy is not conserved in inelastic collisions but is conserved in elastic collisions. The incorrect explanation was given even in the cases where the candidates said inelastic. They did not refer to the data on the graph.
- (c) In Q3.3.1, some learners could not substitute the correct final velocity because they could not interpret the graph. They used the final velocity as the initial velocity.
- (d) Due to the misconception regarding the sign convention many candidates used incorrect signs for initial and final velocities in Q3.3.2. There was also a poor interpretation of data from the graph. Other common mistakes were:
- giving direction when only magnitude was asked;
  - incorrect copying of formulae from the data sheet;
  - no or incorrect interpretation of the sign of the final answer; and
  - no or incorrect unit in the final answer.
- (e) Due to the misconception regarding the sign convention mentioned above, candidates used incorrect signs in Q3.3.3. They started using upward as positive and then later switched to downward as positive. Learners failed to analyse the problem.
- Other common mistakes were:
- incorrect choice of formulae to solve the problem;
  - copying formulae incorrectly from the data sheet;
  - incorrect substitution;
  - incorrect mathematical manipulation;
  - no unit or an incorrect unit at the final answer; and
  - not subtracting the calculated displacement when the ball bounced from the height of the building (15.31 m) to obtain the displacement of the ball.
- (f) In Q3.4, drawing the required graph was a challenge to a number of candidates. Very few managed to get full marks in this question. The majority of candidates failed to interpret the instruction 'take downwards as positive'. Hence many candidates drew the graph above the x-axis.

### Suggestions for improvement

- (a) Learners need more practice in working out examples involving drawing and interpretation of graphs of motion. Questions from previous National and Provincial question papers on projectile motion will be invaluable.
- (b) Learners should pay attention to sign convention. They should practice the solving of problems using one sign convention and then checking their answers using the opposite sign convention.
- (c) Learners must be exposed to more problems on collisions, including the bouncing ball type.

### QUESTION 4: Momentum

#### Common errors and misconceptions

- (a) A significant number of candidates gave the incorrect answer (East) for Q4.1. This shows that candidates could not apply Newton's Third law of motion.
- (b) Q4.2 was poorly answered because candidates could not identify this as an application of Newton's Third Law.
- (c) In Q4.3, many candidates did not use  $\Sigma p_{\text{before}} = 0$ . Candidates could not identify initial and final velocities for the boy and the parcel. The question asked for magnitude only but many also gave the direction.
- (d) In Q4.4, the majority of the candidates were able to state that the velocity will increase but could not explain why. They lost a mark when they did not state that the mass of the boy must be constant when stating the relationship between F and v.

#### Suggestions for improvement

- (a) Momentum is a vector quantity. Emphasis must be placed on the choice of direction when solving 'conservation of momentum' problems. Learners need to be able to state the magnitude of a vector and to specify its direction when given the vector quantity. Learners also need to know and understand vector equations within the confines of the curriculum.
- (b) The teaching of momentum must be integrated with Newton's Laws.
- (c) Learners must be exposed to different applications of conservation of momentum involving both collisions and explosions.
- (d) More explanation-type questions should be given to learners to work out in class.
- (e) Learners should be exposed to questions that integrate different knowledge areas, e.g. momentum and electrostatics, momentum and Newton's Laws, etc.

## QUESTION 5: Work, Energy and Power

### Common errors and misconceptions

- (a) Some candidates could not state the principle of conservation of mechanical energy correctly. Some learners omitted the word 'total'.
- (b) In Q5.2, common errors were:
- Candidates not using the conservation of energy principles but using equations of motion instead; and
  - using the incorrect equation  $E_p(\text{top}) = E_k(\text{bottom})$
- (c) In Q5.3, although well answered, some candidates incorrectly mentioned parallel component and gravity.
- (d) Q5.5 was poorly answered. Common errors were:
- poor understanding of  $W_{\text{net}}$ . Candidates failed to understand that it is the sum of the work done by a number of forces;
  - failure to identify the forces acting on the crate;
  - omitting the square when substituting values into  $\frac{1}{2}m(v_f^2 - v_i^2)$ ;
  - omitting subscripts i.e.  $W$  instead of  $W_{\text{net}}$  and  $F$  instead of  $F_{\text{net}}$ ; and
  - swapping initial and final velocities in the calculation.

### Suggestions for improvement

- (a) More examples testing the application of the principle of conservation of energy are required. Teachers must ensure that learners are aware of the importance of subscripts and the use of correct symbols in formulae.
- (b) Learners must be encouraged to draw labelled free body diagrams even if it is not asked for when solving problems of this type.
- (c) Learners must be exposed to more examples on the Work-Energy theorem.
- (d) Emphasise both the direction in which the forces act and the displacement of the object. Learners must know and understand when to use  $\cos 0^\circ$ ;  $\cos 180^\circ$  and sine.
- (e) Emphasise that gravity is not a force.

## QUESTION 6: Doppler Effect

### Common errors and misconceptions

- (a) Q6.1 was poorly answered. Many could not name the medical instrument and were merely guessing.
- (b) Q6.2 was well answered but there were candidates who interchanged the observed frequency with the source frequency. There are still a large number of learners who are not writing the correct Doppler equation as given in the data sheet.
- (c) Although Q6.3 was reasonably well answered but Q6.4 which asked for the explanation of the answer in Q6.3 was poorly answered. Candidates failed to explain fully the relationship between wavelength and frequency.

### Suggestions for improvement

- (a) Learners should be exposed to all aspects of this section as prescribed in the policy document and guideline document. The Doppler flow meter is clearly mentioned in these source documents.
- (b) Learners should be encouraged to use the data sheet to extract the correct formulae, substitute values into formulae and simplify calculations before changing the subject of the formula. Every learner should be given a copy of the data sheet at the beginning of the year and taught to use it during class tests, control tests and examinations.
- (c) Learners should be taught to work to two decimal places in the final answer.
- (d) In questions where the relationship between two variables is required, it must be emphasised that other variables must be kept constant and that these variables must be mentioned. For example, in Q6.4 it must be mentioned that speed/velocity must be constant for  $-f \propto 1/\lambda$ .

## QUESTION 7: 2D and 3D Wave Motion

### Common errors and misconceptions

- (a) Q7.1 was well answered but some candidates did not give the complete definition and merely stated that it is the bending of waves.
- (b) In Q7.2, some candidates could not see the relationship between broadness of the bright band and wavelength.
- (c) Identifying the dependant variable in Q7.3.1 was a problem for many candidates.
- (d) There was an improvement in the way candidates stated the investigative question (Q7.3.2).
- (e) Q 7.4 was well answered. A common error was the conversion of nm to m and the use of the calculator to determine the angle.
- (f) Candidates knew the pattern produced by a double slit but could not state it clearly (Q7.5).

### Suggestions for improvement

- (a) Teachers should emphasise the need to state definitions clearly.
- (b) More emphasis must be placed on the relationship between the wavelength and broadness of bright bands in single and double slit patterns.

- (c) Use of calculators should also be taught by science teachers especially for the benefit of learners doing Mathematical Literacy.
- (d) As suggested last year, practical work will help learners to differentiate between the patterns observed on a screen when light shines through a double and a single slit.
- (e) Learners need to learn how to convert from one unit to another.

### QUESTION 8: Electrostatics

#### Common errors and misconceptions

- (a) Q8.1 was not well answered. Candidates lost marks for:
  - direction;
  - wavy lines instead of straight lines; and
  - lines touching each other.

Candidates drew large spheres instead of a point charge.

- (b) Learners do not know the difference between uniform and non- uniform fields. (Q8.2)
- (c) Common mistakes observed in Q8.3 were:
  - incorrect conversion from cm to m;
  - not squaring  $r$ ; and
  - incorrect direction.
- (d) Q8.4 was satisfactorily answered. Q8.5 was the worst answered question because candidates did not understand how net fields are calculated.

#### Suggestions for improvement

- (a) Learners must practice how to make sketches of electric field patterns. Emphasis should be placed on producing neat sketches with the correct properties.
- (b) Learners should be exposed to more calculations involving the different formulae to calculate electric field. This will assist them in choosing the correct formula for new situations. For example, learners incorrectly used the formula for Coulomb's Law to calculate the electric field at a certain distance from a point charge in Q8.3.
- (c) More examples at all cognitive levels, especially cognitive level 4 should be given to learners as exercises or tests.



## QUESTION 9: Electric circuits

### Common errors and misconceptions

- (a) Q9.1 was very poorly answered. Some candidates used the equation  $E = V_{\text{ext}} + V_{\text{lost}}$  to explain emf. Other candidates who used  $V = W/Q$  lost a mark because they did not mention '12 J of work done per coulomb of charge moved through the battery'.
- (b) Many candidates performed poorly in Q9.2 because they could not see the relationship between power and current in the electrical device. The power value was given in the stem of the question and not on the diagram. Many candidates started by working out total resistance in the circuit but this was of no use because there was an unknown resistor  $R_x$ .
- (c) The common errors in Q9.3 were:
- not continuing to answer this question using the incorrect value of current from Q9.2. They gave up because they could not obtain an answer to Q9.2;
  - using only the 9 ohm resistor as being parallel to the 4 ohm and  $R_x$ ; and
  - poor mathematical skills in working out resistance in parallel.
- (d) In Q9.4, majority of the candidates could not fully explain their answers because they could not establish the correct relationships between current and resistors in parallel, and between current and power.

### Suggestions for improvement

- (a) There is a need to revise concepts such as emf, potential difference, current strength and lost volts.
- (b) Expose learners to many examples pitched at higher cognitive levels and that use all the relevant equations in the data sheet.
- (c) More explanation-type questions must be given as class exercises and tests.
- (d) There is need for focused training of teachers by subject advisors on current electricity (both theory and practical work) so that it can be taught more effectively.
- (e) Learners need to conduct experiments and do other practical work in order to understand electricity.

## QUESTION 10: Motors, Generators and Alternating current

### Common errors and misconceptions

- (a) Those who answered Q10.1 incorrectly gave answers like 'slip ring commutator' (A) and 'rods' (B).
- (b) For Q10.2, many candidates either did not know the function of the brushes or could not express themselves clearly.
- (c) In Q10.4, candidates could not interpret the graph correctly. They failed to identify the maximum current from the graph.
- (d) Q10.5 was poorly answered because candidates could not determine the period from the graph.

- (e) Candidates could not interpret the graph in relation to the position of the plane of the coil in Q10.6.
- (f) The common errors in Q10.7 were:
- Incorrect equations for  $I_{\text{rms}}$  and  $V_{\text{rms}}$ ;
  - using 311 V as  $V_{\text{rms}}$ ;
  - not showing all workings on paper
  - not writing the equations for  $I_{\text{rms}}$ ; and
  - incorrect use of a calculator to do the working.

### Suggestion for improvement

- (a) There is a need to teach learners to interpret and to sketch graphs starting with different positions of the plane of the generator coil.
- (b) Emphasis should also be placed on writing formulae and/or symbols correctly, e.g. learners were writing **F** for frequency instead of **f** and **t** for period instead of **T**.
- (c) Learners must show all steps in calculations.

### QUESTION 11: Photo-electric effect

#### Common errors and misconceptions

- (a) In Q11.1.2, candidates could not use the correct equation to calculate the energy of the incident light. Other common errors were:
- conversion of nm to m.;
  - velocity value not squared; and
  - poor mathematical manipulation.
- (b) Candidates did not know the relationship between frequency and kinetic energy of photoelectrons in Q11.1.3.
- (c) Candidates could not state and explain the relationship between intensity and speed of photoelectrons.
- (d) Q11.2 was an application question in which learners performed poorly. Candidates could not relate colour to frequency and hence energy.
- (e) Q11.3 was also an application type question in which candidates did not have a sound knowledge on types of spectra.

#### Suggestions for improvement

- (a) Use past year question papers to expose learners to as many types of questions as possible.
- (b) Make use of resources such as PHET simulations to demonstrate the photo-electric effect and factors that influence it, for example, the effect of frequency and light intensity on the kinetic energy and number of photo-electrons emitted.

## 12.5 OVERVIEW OF LEARNER PERFORMANCE IN PAPER 2

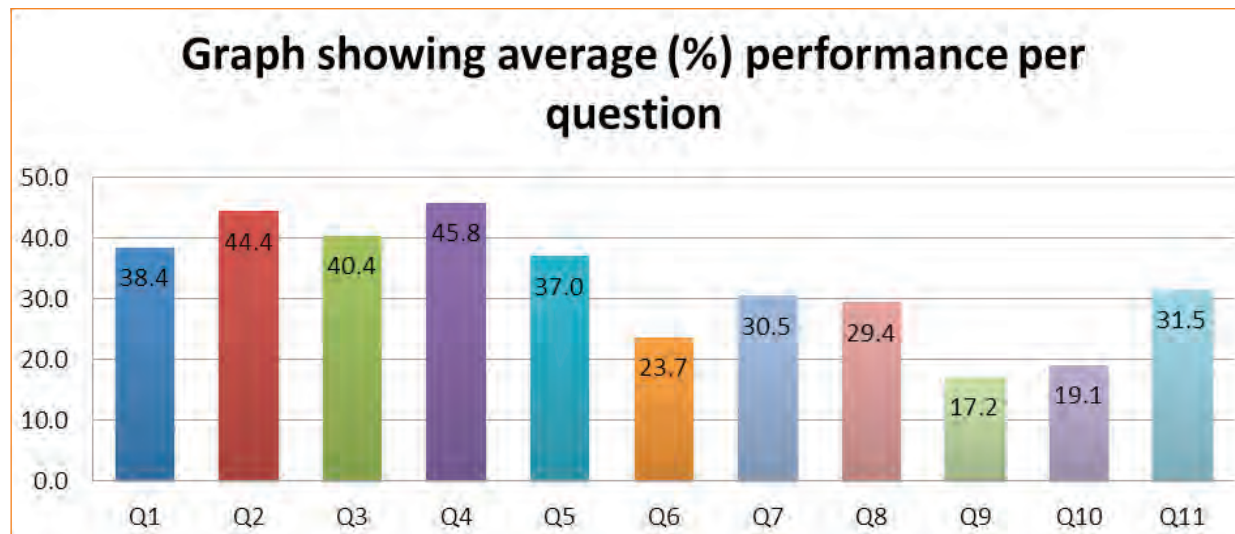
### General Comments

- (a) The overall performance of candidates in this paper was not good.
- (b) The questions on organic chemistry (Q3, Q4, Q5) were fairly well answered.
- (c) Lack of skills to interpret data and to give reasons/explanations resulted in the very poor answering of the question on reaction rate (Q6).
- (d) Stoichiometric calculations (Q6.6 & Q9.3) were poorly answered. Although most candidates could select the correct formula, they often failed to work with correct mole ratio.
- (e) Q9 (electrolytic cells) was extremely poorly answered. Many candidates obtained zero for this question. Electrolytic cells remains a poorly understood section of the work.
- (f) In general, candidates had a poor understanding of electrochemistry (Q8, Q9, Q10).
- (g) The inability to answer questions like Q6.4, Q6.6, Q8.3, Q9.3 and Q10, which were somewhat “outside the box”, although not difficult, is worrisome, as it points to a serious flaw in the thinking skills of candidates.

## 12.6 DIAGNOSTIC QUESTION ANALYSIS FOR PAPER 2

A sample of scripts from each province revealed the following average percentages on each question.

Figure 12.6.1: Average marks per question expressed as a percentage (Paper 2)



Question	Average Performance (%)	Content
Q1	38.4	One-word items – all topics
Q2	44.4	Multiple choice questions –all topics
Q3	40.4	Organic nomenclature
Q4	45.8	Physical properties of organic compounds
Q5	37.0	Organic reactions
Q6	23.7	Reaction rate
Q7	30.5	Chemical equilibrium
Q8	29.4	Galvanic cells
Q9	17.2	Electrolytic cells
Q10	19.1	Batteries
Q11	31.5	Fertilisers

## 12.7 ANALYSIS OF LEARNER PERFORMANCE IN INDIVIDUAL QUESTIONS: PAPER 2

### QUESTION 1: One-word items

#### Common errors and misconceptions

Candidates did not know basic definitions and therefore the wording or phrasing of the question easily confused them. Q1.2 was the best answered sub-question, whilst Q1.4 and Q1.5 were extremely poorly answered.

- (a) Many candidates did not fully understand the meaning of the term fractional distillation (Q1.1 – fertiliser industry) and gave frictional distillation as an answer. Other common incorrect answers were: Chlor-alkali; Ostwald process; Haber process; distillation; fractional; nitrification; galvanic cell; and cracking.
- (b) In Q1.2 (organic reactions), an answer specific to the removal of water was expected. Some candidates gave elimination as an answer which is not applicable to water only. It was also evident that many candidates could not differentiate between hydration and dehydration. Hydration was therefore a common incorrect answer. Other common incorrect answers were: hydrolysis; hydrogenation; and dehydrogenation.
- (c) The most common incorrect response to Q1.3 (chemical equilibrium) was Le Chatelier's principle, showing that many candidates did not fully grasp the difference between the theory used to explain reaction rate and the principle applied in determining the effect on an equilibrium system. Other incorrect responses were: Maxwell Boltzman; reaction rate; molecular kinetic; Boyle; Planck; and Faraday.
- (d) In Q1.4 (redox reactions) many candidates did not understand the difference between the name of the process (oxidation) and the substance (reducing agent). Therefore oxidation was a common incorrect answer. Some wrote reduction agent instead of reducing agent. Another common incorrect answer was 'oxidising agent', showing that many candidates could not distinguish between an oxidising and a reducing agent. Other common incorrect answers were: reducer; oxidation; oxidation agent; anode; reduction; oxidising agent; oxidant; and reduced substance.
- (e) In Q1.5 (organic nomenclature) most candidates were not familiar with the definition of a homologous series. Some gave homologous group or homologous structure as an answer. Other common incorrect answers were: organic molecules; functional group; hydrocarbons; alkanes; alkenes; alkyl groups; and isomers.

#### Suggestions for improvement

- (a) Definitions must be emphasised and tested regularly throughout the year.
- (b) Teachers must encourage learners to develop a glossary of key terms per section and to study these terms. Also make sure that learners understand the meaning of these terms.
- (c) The best way to ensure that learners study the basics is through frequent informal testing. This should be done on a daily basis, sometimes orally and sometimes as a short test that can be written in homework books and marked by the learners.
- (d) A document containing all definitions could be very useful to learners to ensure that they learn the correct definitions and have them at hand at all times.

## QUESTION 2: Multiple choice questions

### Common errors and misconceptions

Apart from Q2.3, Q2.5 and Q2.8, the multiple choice questions were well answered.

- (a) Some candidates did not know the functional group of aldehydes (Q2.1 - organic nomenclature) and gave *A* (functional group of an ester) or *B* (functional group of a carboxylic acid) as answer.
- (b) Many candidates did not know that a single substituent on a cycloalkane (Q2.2 – IUPAC naming) does not receive a number in the IUPAC name e.g. chlorocyclohexane, and thus its position will make no difference to the IUPAC name.
- (c) Candidates who answered Q2.3 (organic reactions) incorrectly mainly gave *B* as answer. They probably learnt that but-2-ene instead of but-1-ene is the major product during elimination, but failed to see that in the case of a halopropane only one product, prop-1-ene, is possible. Prop-2-ene does not exist. Some candidates could not differentiate between the major product formed when using concentrated NaOH and when using dilute NaOH and thus gave *D* as an answer.
- (d) Molecular distribution curves (Q2.4) were poorly understood. Most candidates gave *A* as the answer, thinking that the curve with the highest peak represents the highest temperature. They did not know that the highest temperature is represented by the curve with the largest portion of molecules in the highest kinetic energy region (temperature is a measure of the average kinetic energy).
- (e) Candidates could not apply Le Chatelier's principle correctly to identify the factor that will increase the yield of products (Q2.5 - chemical equilibrium). The most common incorrect response was *A* (increase in temperature). Candidates failed to interpret  $\Delta H < 0$  as exothermic or else they did not know that an exothermic reaction is favoured by a decrease in temperature.
- (f) The concentration versus time graph (Q2.6 – chemical equilibrium) was poorly interpreted by some candidates. The most common incorrect response was *D* (the concentrations of the reactant and product are equal). The graph clearly indicates that the concentrations are not equal!
- (g) The use of the Table of Standard Reduction Potentials was poorly understood (Q2.7 – redox reactions). Most candidates gave *B* as answer, showing that they, despite the table showing the direction in which the oxidising ability increases, could not deduce which one is the strongest oxidising agent.
- (h) Q2.8 (galvanic cells) was the poorest answered multiple choice question. Candidates were not able to use their knowledge in an argument. The most common incorrect answer was *A*. These candidates could not distinguish between cell potential and the heat of reaction.
- (i) Q2.9 (galvanic cells - function of salt bridge) was a basic recall question and was fairly well answered. Many learners were not aware that a salt bridge maintains electrical neutrality in a galvanic cell.
- (j) Q2.10 (chlor-alkali industry) was a basic recall question and was fairly well answered. Some candidates did not know the different processes and products formed at the different electrodes.

## Suggestions for improvement

- Learners should be exposed to graphs on a regular basis. Include drawing of accurate graphs and sketch graphs as well as questions requiring interpretation of graphs in daily written work, class tests and formal tests.
- The use of the Table of Standard Reduction Potentials should be thoroughly explained to learners and they should be given ample exercises to practise its use.
- Teachers should receive thorough training on the use of the Table of Standard Reduction Potentials to ensure that they are in a position to explain to learners how to use the table.
- Ensure that multiple choice questions are tested on a regular basis and that these questions are used in class tests, standardised tests and examinations. Learners need to be equipped on how to answer multiple-choice questions. This involves eliminating options that are totally incorrect and then making an educated deduction from the remaining options as to which option is the most correct one.
- When preparing learners for answering multiple choice questions during class tests, let them give reasons for selecting a specific answer. In doing so guesswork can be reduced and learners are taught how to reason when answering multiple choice questions.
- Learners should attempt every multiple choice question. The chance of being correct is 25%. There is no chance of obtaining any marks if left blank.

## QUESTION 3: Nomenclature of Organic Compounds

Common errors and misconceptions

This question was generally well answered.

- A majority of the candidates who did not obtain full marks for Q3.1.1, gave the symbol of only one of the alkenes and did not realise that the symbols of both alkenes in the table were expected.
- Those who answered Q3.1.3 incorrectly did not know what a general formula was as they could get to the correct answer by counting the atoms in the given compounds.
- Lack of knowledge of cycloalkenes was probably the reason for the poor answering of Q3.1.4. Many candidates gave C (hex-2-ene) as an answer, not knowing that alkynes have the same general formula as cycloalkenes and therefore an alkyne and a cycloalkene can be structural isomers.
- Writing of IUPAC names (Q3.2.1; Q3.2.2; Q3.2.3) was a challenge to many candidates. Common errors were:
  - omitting hyphens e.g. 4 methylpent 2 yne;
  - including a hyphen between two terms e.g. 4-methyl-pent-2-yne;
  - using a semicolon between numbers instead of a comma e.g. 2;3-dibromo-5-methylheptane; and
  - leaving spaces in the IUPAC name e.g. 4-methyl pent-2-yne.
- Common errors specific to Q3.2.1 were:

- not giving preference to the functional group i.e. the double bond when numbering e.g. 2,3-dimethylhex-4-ene;
  - not numbering the functional group i.e. the double bond e.g. 4,5-dimethylhexene; and
  - a combination of the above two bullets e.g. 2,3-dimethylhexene.
- (d) Common errors specific to Q3.2.2 were:
- Using hexane instead of heptane as the longest chain e.g. 2,3 dibromo-5-ethylhexane;
  - Counting the C atom of the main chain as being a part of the side chain e.g. 2,3-dibromo-5-ethylheptane; and
  - Ignoring the alphabetical order when naming substituents e.g. 5-methyl-2,3-dibromoheptane.
- (e) In Q3.2.3 candidates did not give preference to the functional group i.e. the triple bond in this case, when numbering C atoms in the parent chain e.g. 2-methylpent-3-yne.
- (f) As a result of poor spelling many candidates wrote 'esther' or 'easter' instead of 'ester'. Other common incorrect answers were: ether; carboxylic acids; ketones.
- (g) Common errors when writing the structural formula of pentyl propanoate (Q3.3.2) were:
- including an H between the carbonyl C atom and the O atom from the alcohol;
  - adding a H atom on the carbonyl C atom;
  - omitting H atoms;
  - placing functional groups in the wrong positions; and
  - writing the structural formula of propyl pentanoate instead of pentyl propanoate.
- (h) Many candidates wrote pentanoic acid instead of propanoic acid (Q3.3.3). They did not know that the alkyl group of the ester originally belongs to the alcohol and not to the carboxylic acid. There was also a tendency of only writing propanoic, omitting the word acid. Another common incorrect answer was propanoate acid.
- (i) Some candidates thought that any acid was suitable as a catalyst (Q3.1.4). Common incorrect answers were: carboxylic acid; hydrochloric acid; sodium chloride; platinum.

### Suggestions for improvement

- (a) Teachers should ensure correct pronunciation of words and also write terms e.g. ester, on the board when pronouncing it. In doing so, spelling mistakes such as easter and haxane instead of *ester* and *hexane* will be eliminated.
- (b) Teach learners that hyphens and commas are a part of the correct IUPAC name and cannot be left out. Also ensure that learners know that they are penalised if they include spaces in an IUPAC name that is supposed to be written as one word.
- (c) Teach learners that when an IUPAC name is asked for, marks will only be awarded for a complete IUPAC name e.g. a correct IUPAC name is propanoic acid and not propanoic.



## QUESTION 4: Physical Properties of Organic Compounds

### Common errors and misconceptions

Candidates performed well in this question on physical properties of organic compounds.

- (a) Instead of writing *sample* as the independent variable (Q4.1.1), many candidates listed one of the following incorrect answers: *volume of the samples*; *mass of the sample*; *molar mass*; *bottles*. Some swapped the dependent and independent variables.
- (b) Most candidates had no problem in giving the correct dependent variable (Q4.1.2). The most common incorrect answer was temperature. Some swapped the dependent and independent variables.
- (c) Some candidates did not understand the meaning of the term phrase and copied the whole sentence (Q4.2). Some copied the whole paragraph.
- (d) Matching the homologous series to the boiling points (Q4.3.1 & Q4.3.2) were fairly well answered.
- (e) Most candidates who correctly identified the alcohol as compound R in Q4.3.2, gave its high boiling point as part of the reason (Q4.3.3), but many failed to refer to the hydrogen bonds between alcohol molecules. Common vague/incorrect reasons were:
- Stronger forces between molecules;
  - Force between an oxygen atom and a hydrogen atom;
  - Hydrogen and oxygen bonds;
  - H/O bonds; and
  - Hydrogen forces.
- (f) A number of candidates referred to stronger intermolecular forces between carbon atoms in hexane (Q4.4) and forfeited a mark. Most candidates forfeited the fourth mark either because they did not write about the energy involved, or their answer was incomplete. A common misconception was that candidates thought that more energy is needed to break the carbon chain or to break the molecules. Common incomplete/incorrect statements regarding the energy involved were:
- More energy needed to break bonds;
  - More energy needed to break down the hexane molecules; and
  - More energy is needed to boil hexane.

### Suggestions for improvement

- (a) Differentiate between intermolecular forces and interatomic bonds using diagrams. Ensure that learners understand that a phase change is the result of changes in intermolecular forces and not in bonds between, for example, carbon atoms.
- (b) Expose learners regularly to questions that require explanations in order to improve their skills in answering such questions.

- (c) Teach learners to use the correct wording when answering questions that expect a comparison between, for example, the boiling points of compounds. Words such as higher than/highest or lower than/lowest boiling point should be used and not just the compound has a high/low boiling point.
- (d) Ensure that learners understand the difference between temperature and boiling point. Boiling point is a specific temperature, but temperature is not boiling point.

### QUESTION 5: Reactions of Organic Compounds

#### Common errors and misconceptions

Q5 was one of the better answered questions in the paper.

- (a) Most candidates identified compound Q as an alkene (Q5.1). Those who had it wrong mostly wrote alkane.
- (b) Writing of the equation for the reaction of compound P with chlorine (Q5.2.1) was a challenge to most candidates. Common errors were:
- using  $\text{Br}_2$  as a reactant instead of  $\text{Cl}_2$ ;
  - using  $\text{Cl}$  instead of  $\text{Cl}_2$  as a reactant;
  - omitting the  $\text{HCl}$  as one of the products;
  - omitting the arrow ( $\rightarrow$ ) in the reaction equation or using an equal to sign ( $=$ ) instead;
  - using condensed formulae instead of molecular formulae; and
  - using structural formulae instead of molecular formulae.
- (e) Many candidates wrote hydrohalogenation or addition instead of halogenation (Q5.2.2).
- (f) In Q5.2.3, candidates used temperature, instead of heat or high temperature, as a reaction condition. Other incorrectly used words were: dilute heat; concentrated heat; weak heat. Catalyst was also a common incorrect answer given.
- (g) Most candidates drew the correct structural formula in Q5.3.1. Common errors were:
- using  $\text{br}$  or  $\text{BR}$  as symbol for bromine; and
  - omitting the bonds ( $-$ ) between C atoms and/or between C and H atoms.
- (h) Most candidates could not analyse the flow diagram (Q5.3.2) to deduce the position of the double bond. Therefore most candidates gave the incorrect IUPAC name. Common errors were:
- omission of the number representing the position of the double bond e.g. butene;
  - incorrect position of the double bond e.g. but-1-ene; and
  - writing butan-2-ene instead of but-2-ene.
- (i) Candidates performed fairly well in Q5.3.3. Common errors were:

- writing the structural formula of but-1-ene instead of but-2-ene as one of the reactants;
- using H<sub>2</sub>O instead of H<sub>2</sub> as one of the reactants;
- adding too many H atoms around the C atoms forming the double bond in but-2-ene;
- adding a second product;
- omitting the arrow (→) in the reaction equation or using an equal sign (=) instead; and
- omitting bonds between C atoms and between C and H atoms.

(j) A common incorrect answer in Q5.3.4 was hydration instead of hydrogenation.

### Suggestions for improvement

- (a) Expose learners to the reaction of different halogens (Br<sub>2</sub> and Cl<sub>2</sub>) with alkanes and alkenes as the use of only one type of halogen causes learners to think that it is the only possibility.
- (b) Teach learners to use the correct wording when referring to reaction conditions e.g. mild heat instead of dilute heat and heat strongly or high temperature instead of concentrated heat.

### QUESTION 6: Reaction Rate

#### Common errors and misconceptions

Candidates found this question challenging.

- (a) Many candidates swapped the independent (Q6.1.1) and the dependent variable (Q6.1.2). Some identified the amount of catalyst instead of the type of catalyst as the independent variable in Q6.1.1.
- (b) Most candidates identified the correct catalyst in Q6.2, but many failed to give a correct explanation for the answer. A common misconception was that the reaction reaches equilibrium the fastest. Such candidates did not know that equilibrium cannot be reached in an open system. Candidates who provided an explanation using the graph often stated that the *graph R* is steeper instead of stating that the *slope of the graph of R* is steeper.
- (c) Most candidates could not explain how a catalyst functions (Q6.3). Common misconceptions were that a catalyst increases the kinetic energy of molecules or a catalyst increases the number of particles resulting in more effective collisions. Many of those who knew that a catalyst decreases the (net) activation energy by providing an alternate pathway for the reaction, failed to give a correct explanation in terms of the collision theory. Candidates often left out key words such as 'more' and 'kinetic' and only referred to more molecules having sufficient energy or molecules having sufficient kinetic energy. Most candidates forfeited the third mark due to omission of the terms 'effective' and 'per unit time'. The full statement should be 'more effective collisions per unit time'.
- (d) The calculation in Q6.4 was a challenge to many candidates. Many did not know how to approach the calculation and calculated the average rate by dividing the total of the first three concentrations in the table by 3. Others tried to use  $c = \frac{n}{V}$ . Those who used rate =  $\frac{\Delta c}{\Delta t}$  often made the following errors:
- Using the concentration at 400 s instead of change in concentration from 0 s to 400 s;
  - Using the change in concentration between 200 s and 400 s; and
  - Adding an incorrect unit to the final answer

- (e) Most candidates gave the correct answer (Q6.5), but many failed to give the correct reason i.e. a decrease in concentration of the hydrogen peroxide. Common incorrect explanations were as follows:
- The amount/mass of reactants decreases;
  - Rate is inversely proportional to time;
  - Concentration is inversely proportional to time; and
  - Reactants were used up.
- (f) Almost all candidates obtained at least one mark for Q6.6 for selecting an appropriate formula. Very few candidates obtained full marks for this question.

Common errors were as follows:

- Using the concentration at 600 s ( $0,016 \text{ mol}\cdot\text{dm}^{-3}$ ) instead of the change in concentration in the 600 s i.e.  $0,0200 - 0,0106$ ;
- Using the incorrect concentration values to calculate the change in concentration e.g.  $0,0200 - 0,0131$ ;
- Using the molar gas volume at STP ( $22,4 \text{ dm}^3$ ) to calculate the mole of hydrogen peroxide;
- Ignoring the mole ratio in the balanced equation i.e.  $n(\text{O}_2) = \frac{1}{2}n(\text{H}_2\text{O}_2)$ ;
- Using  $16 \text{ g}\cdot\text{mol}^{-1}$  as the molar mass for oxygen gas;
- Incorrect conversion of  $50 \text{ cm}^3$  to  $\text{m}^3$ ; and
- Using an incorrect unit or omitting the unit.

### Suggestions for improvement

- (a) Give learners sufficient written work on reaction rate e.g. interpretation of graphs, calculation of rate from given data or a graph and explanations in terms of the collision theory.
- (b) Ensure that stoichiometry is properly taught in grades 10 and 11 and revised in grade 12.
- (c) Give learners sufficient written work covering different types of stoichiometric calculations.

## QUESTION 7: Chemical Equilibrium

### Common errors and misconceptions

The performance in this question was poor, although the mark allocation in the  $K_c$  calculation generally enables most candidates to score some marks.

- (a) Most candidates did not know the meaning of a  $K_c$  value (Q7.1) and thus could not link the value of  $K_c$  to the yield of the reaction. Seemingly many of those who answered correctly took a guess as they failed to give a reason for their choice. Many thought that the -4 in  $K_c = 1,2 \times 10^{-4}$  means a negative value and answered that  $K_c$  is less than 0.
- (b) The  $K_c$  calculation (Q7.2) was a challenge to many candidates as they were not familiar with the use of an unknown (x) in calculations. Those who used an unknown in their calculations often failed to solve the final answer due to lack of mathematical skills. Most common errors were as follows:
- No  $K_c$  expression or incorrect  $K_c$  expression (Note that  $\frac{[\text{products}]}{[\text{reactants}]}$  is NOT a  $K_c$  expression!);
  - Using the coefficients in the balanced equation as the number of moles of reactants that reacted and products that formed instead of an unknown;
  - Using the initial number of moles of reactants as the number of moles at equilibrium and then solving for [NO];
  - Writing the  $K_c$  expression without squaring the numerator due to negligence i.e. [NO] instead of [NO]<sup>2</sup>;
  - Adding the concentrations of reactants in the denominator of the  $K_c$  expression.
- (c) Most candidates did not know how to apply Le Chatelier's principle to explain the effect of pressure on a reaction at equilibrium (Q7.3). They failed to see that pressure will not influence the equilibrium as the number of moles of reactants in the gaseous phase is equal to the number of moles of products in the gaseous phase.
- (d) Most of those who got endothermic correct (Q7.4) failed to give a correct explanation. Common errors were as follows:
- Explaining in terms of an increase in amount of products instead of an increase in the concentration of products; and
  - Only stating the meaning of endothermic i.e. heat was absorbed.

### Suggestions for improvement

- (a) Place more emphasis on explanations requiring Le Chatelier's principle.
- (b) Ensure learners know the factors that influence equilibrium i.e. concentration temperature and pressure (gases only). An increase in the amount of products will not influence equilibrium, but only an increase in the concentration of products will.
- (c) Give learners enough practice in solving  $K_c$  related problems starting from the basics to the extremely difficult, including solving problems with an unknown.
- (d) Teach learners, when using a table in the solution of a  $K_c$  calculation, to use correct names for rows e.g. initial amount/mole, change in amount/mole, equilibrium amount/mole and equilibrium concentration. Learners must not use unfamiliar abbreviations.

- (e) Ensure that learners know and understand the meaning of  $K_c$  values and be able to predict yield in a particular reaction by looking at the  $K_c$  value.
- (f) Teach learners to follow instructions in question papers e.g. if the paper requires them to choose from *increases*, *decreases* or *remains the same*, they should not invent their own words with similar meanings.

### QUESTION 8: Galvanic Cells

#### Common errors and misconceptions

This question was generally poorly answered.

- (a) Most candidates could not interpret the given equation (Q8.1.1) to identify the oxidising agent. Many stated the symbol of the element (Au), without the ionic charge. Common incorrect answers were: Au;  $\text{Cl}^-$ .
- (b) A common incorrect answer given in Q8.1.2 was  $\text{Au} \rightarrow \text{Au}^{3+} + 3\text{e}^-$ . Those who selected the correct half-reaction often failed to write it as an oxidation reaction.

Other common errors were as follows:

- $\text{Cl}_2 + 2\text{e}^- \rightarrow 2\text{Cl}^-$ ;
- Using double arrows in the half-reaction; and
- Omitting the charge on the negative ion.

Most candidates obtained only the one mark for the double vertical lines representing the salt bridge in the cell notation (Q8.1.3). Many wrote the cell reaction or calculated the cell potential instead of giving the cell notation. The difference between these concepts was poorly understood. Many of those who knew what cell notation was, made one of the following errors:

- Writing the respective half-reactions to the left and right of the double vertical lines representing the salt bridge in the cell notation;
- Including more than one salt bridge;
- Including numerical coefficients e.g.  $\text{Pt}|\text{6Cl}^-|\text{3Cl}_2||\text{2Au}^{3+}|\text{2Au}$ ;
- Omitting the platinum electrode in the cell notation e.g.  $\text{Cl}^-|\text{Cl}_2||\text{Au}^{3+}|\text{Au}$ ;
- Swapping the oxidising agent and the reduced species e.g.  $\text{Cl}_2|\text{Cl}^-||\text{Au}^{3+}|\text{Au}$ ; and
- Swapping the anode and cathode e.g.  $\text{Au}|\text{Au}^{3+}||\text{Cl}^-|\text{Cl}_2$ .

- (a) The question involving the calculation of the reduction potential of Au (Q8.2) was fairly well answered in comparison to the other sub-questions.

Common errors were as follows:

- Using abbreviations in the formula e.g.  $E_{\text{cell}} = E_{\text{red}} - E_{\text{ox}}$ ;
- Substituting the cell potential as  $E_{\text{red}}$ ;
- Substituting  $E_{\text{anode}}$  as  $E_{\text{cathode}}$ ;

- Substituting the reduction potential of the anode with that of the cathode; and
  - Omitting the unit at the final answer.
- (b) Most candidates failed to predict the effect of the light bulb on the voltmeter reading (Q8.3). A common incorrect answer was that the initial and final voltmeter readings will be equal because the cell has no internal resistance. Many of those who knew or guessed that the reading will decrease could not explain it in terms of the internal resistance of the battery.

Common incorrect explanations were as follows:

- The voltage decreases because the bulb uses energy;
- The voltage decreases because the current divides;
- The voltage decreases because the bulb is an additional resistance;
- Voltage decreases as the resistance increases; and
- The voltage decreases because the potential difference in a series circuit divides.

### Suggestions for improvement

- (a) Ensure that learners know the terms oxidation, reduction, reducing agent and oxidising agent. Give learners enough exercises to practise their understanding of these terms, for example, to identify the oxidising agent in a given reaction.
- (b) Thoroughly explain the use of the Table of Standard Reduction Potentials to learners. Once learners grasp how to use the table, they will be able to answer any redox reaction question.
- (c) Ensure that learners know the following when writing the cell notation for a galvanic cell:
- The  $\text{H}_2|\text{H}^+$  cell is treated just like any other half-cell. It is NOT always written on the left.
  - Cell terminals (electrodes) are written on the outside of the cell notation.
  - The correct order is always as follows: reducing agent | oxidised species || oxidising agent | reduced species
  - If inert electrodes are used e.g. platinum, then the order is as follows:

$\text{Pt} | \text{reducing agent} | \text{oxidised species} || \text{oxidising agent} | \text{reduced species} | \text{Pt}$

Examples:

1.  $\text{Mg}|\text{Mg}^{2+}||\text{H}^+|\text{H}_2|\text{Pt}$
2.  $\text{Pt}|\text{H}_2|\text{H}^+||\text{Cu}^{2+}|\text{Cu}$
3.  $\text{Mg}|\text{Mg}^{2+}||\text{F}_2|\text{F}^-|\text{Pt}$
4.  $\text{Pt}|\text{Cl}^-|\text{Cl}_2||\text{F}_2|\text{F}^-|\text{Pt}$

- (d) Introduce galvanic cells to learners as batteries used in, for example, torches. Ensure that learners understand that the chemistry of galvanic cells deals with the functioning of the same cells used in electric circuits in Physics.

### QUESTION 9: Electrolytic Cells

#### Common errors and misconceptions

The question was poorly answered and many obtained zero for this question.

- (a) Most candidates were not familiar with the concept of electrolysis (Q9.1). Common errors were as follows:
- Electrolysis is a substance (instead of a process) that changes electrical energy into chemical energy;
  - Electrical energy is changed to mechanical energy; and
  - Chemical energy is changed into electrical energy.
- (b) Most candidates failed to deduce that  $\text{Cr}(\text{NO}_3)_3$  contains  $\text{Cr}^{3+}$  ions (Q9.2.1) and therefore  $\text{Cr}^{2+} + 2\text{e}^- \rightarrow \text{Cr}$  was a common incorrect answer given. Other common errors were as follows:
- Writing the reduction half-reactions as  $\text{Cr}^{3+} + \text{e}^- \rightarrow \text{Cr}^{2+}$ ;
  - Writing the half-reaction as an oxidation i.e.  $\text{Cr} \rightarrow \text{Cr}^{3+} + 3\text{e}^-$ ;
  - Using the spanner as an element e.g.  $\text{Spanner} + 2\text{e}^- \rightarrow \text{spanner}^{2-}$  or  $\text{Sp} + 2\text{e}^- \rightarrow \text{Sp}^{2-}$ ; and
  - Using double arrows or an equal to sign in the correct half-reaction.
- (c) Some candidates wrote chrome or chromium instead of chromium (Q9.2.2). Candidates also tend to replace the Cr given in the paper with another element known to them and therefore common incorrect answers were: platinum; iron; aluminium; copper.
- (d) Most candidates ignored the charge on the ion and wrote chromium, Cr or Cr ions instead of chromium(III) ions or  $\text{Cr}^{3+}$  (Q9.2.3).
- (e) The stoichiometric calculation (Q9.3) was challenging to most candidates. Common errors were as follows:
- Ignoring the ratio i.e. 1 mole of  $\text{Cr}^{3+}$  gains 3 moles of electrons;
  - Using the molar mass of  $\text{Cr}(\text{NO}_3)_3$  i.e. 238 instead of the molar mass of Cr i.e. 52 ;
  - Substituting  $M = 52$  into an incorrect formula e.g.  $c = \frac{n}{V}$  ;
  - Substituting the mass in  $n = \frac{m}{M}$  as 52 ; and
  - Using an incorrect unit at the final answer.

#### Suggestions for improvement

- (a) Ensure that learners study definitions related to electrolytic cells (e.g. electrolysis, electrolyte, oxidation, reduction) and test their knowledge of definitions frequently through questioning and informal tests.



- (b) Expose learners to different examples of electroplating. Copper and silver are not the only metals used during electroplating. Ensure that learners understand the principles of electroplating rather than focusing on memorising of e.g. plating of copper or silver.
- (c) Teach learners the importance of the charge when identifying an ion as either an oxidising or a reducing agent.

### QUESTION 10: Batteries

#### Common errors and misconceptions

Writing of a net cell reaction from half-reactions was a challenge to most candidates.

- (a) Most candidates missed the important aspects of an electrolyte (Q 10.1) i.e. to conduct electricity through movement of ions. Candidates also seemed not to understand the difference between the process (electrolysis) and the solution (electrolyte). Common incorrect definitions were as follows:

- A substance / liquid that conducts electricity;
- A solution that conducts electricity through movement of electrons;
- The transfer of electrical energy to chemical energy; and
- The acid which conducts electricity.

- (b) Most candidates could not interpret the signs of the reduction potentials (Q10.2) of the two given half-reactions. They did not know that the half-reaction with the more negative reduction potential will be the oxidation half-reaction and will take place at the anode. Common errors were as follows:

- Choosing the half-reaction with the more positive reduction potential as the oxidation;
- Choosing the correct half-reaction, but writing it as a reduction i.e.  $\text{PbSO}_4 + 2\text{e}^- \rightarrow \text{Pb} + \text{SO}_4^{2-}$  instead of  $\text{Pb} + \text{SO}_4^{2-} \rightarrow \text{PbSO}_4 + 2\text{e}^-$ ; and
- Ignoring the given half-reactions given in the paper and using irrelevant half-reactions instead e.g.  $\text{SO}_4^{2-} + 4\text{H}^+ + 2\text{e}^- \rightarrow \text{SO}_2 + \text{H}_2\text{O}$ .

- (c) Writing of the net cell reaction (Q10.3) was poorly understood. Common errors were as follows:

- Using the half-reaction not selected in Q10.2 as the cell reaction;
- Adding the two half-reactions as they appear in the question paper without writing one as an oxidation;
- Writing the reverse reaction;
- Not cancelling of electrons on both sides of the equation;
- Calculating cell potential instead of writing the cell reaction;
- Writing of the cell notation of the cell instead of the cell reaction; and
- Omitting the charge(s) of one or more ions.

- (d) The calculation of the energy stored in the battery (Q10.4.1) was attempted by most candidates. Very few candidates obtained full marks due to one or more of the following errors:
- Writing  $E = Vq$  instead of  $W = Vq$ ;
  - Substituting  $q$  in  $W = Vq$  as 7500 instead of  $(7500)(3600)$  – cell capacity was thus converted to charge in coulombs;
  - Calculating the charge as  $\frac{7500}{3600}$  instead of  $(7500)(3600)$ ;
  - Incorrect conversion of hours to seconds;
  - Using incorrect formulae e.g.  $C = \frac{Q}{V}$  and  $R = \frac{V}{I}$ ; and
  - Calculating the cell potential (the first calculation required in Q10.4.2).
- (e) Many candidates did not attempt Q10.4.2. When attempted, lack of basic mathematical skills failed them. Common errors were as follows:
- Calculating the cell potential of the cell incorrectly as -2,05 V;
  - Using  $\frac{2,05}{300}$  instead of  $\frac{300}{2,05}$  to calculate the number of cells;
  - Giving the final answer as 146 instead of rounding up to 147; and
  - Calculating the number of cells as  $n = \frac{Q}{Q_e}$  where  $Q_e = 1,6 \times 10^{-19} \text{ C}$ .

### Suggestions for improvement

- Ensure that learners have the correct definitions of terms related to batteries and that they study these definitions regularly.
- Teach learners how to use the reduction potential values to choose the correct half-reaction as, for example, the oxidation.
- Give learners enough practise in balancing of redox reactions using half-reactions.

### QUESTION 11: Fertilisers

#### Common errors and misconceptions

If this topic is given proper attention, it can be an area where marks can be obtained easily.

- Candidates had a poor knowledge of the function of the three primary nutrients in plants (Q11.1). Common errors were as follows:
  - Swapping the answers of the three sub-questions;
  - Using phosphate instead of phosphorous in Q11.1.1;
  - Using incorrect symbols for the primary nutrients e.g. some wrote potassium (P) as an answer to Q11.1.3; and
  - Not knowing the primary nutrients and giving irrelevant answers e.g. carbon dioxide; oxygen; air; water; atoms.

- (b) The Haber process (Q11.2) was known to most candidates. Spelling in Q11.2.1 was a problem as many wrote 'Harbour' process. The balanced equation was not well answered due to one or more of the following errors:
- Writing one of the equations of the Ostwald process;
  - Using H and N as atoms and not as diatomic molecules;
  - Incorrect balancing;
  - Using an equal to sign (=) instead of an arrow ( $\rightarrow$ ); and
  - Using incorrect symbols for hydrogen and nitrogen e.g. h and n instead of H and N.
- (c) Most candidates failed to compare the two fertilisers (Q11.3) by referring to the type of elements present in each. They mentioned that  $(\text{NH}_4)_2\text{HPO}_4$  has two primary nutrients and  $\text{NH}_4\text{NO}_3$  has one, but did not name the primary nutrients. Common errors were as follows:
- Referring to the primary nutrients in  $(\text{NH}_4)_2\text{HPO}_4$  as phosphate and nitrate instead of phosphorous and nitrogen; and
  - Not comparing the two fertilisers e.g. only stating that  $(\text{NH}_4)_2\text{HPO}_4$  contains phosphorous and nitrogen without mentioning  $\text{NH}_4\text{NO}_3$ .
- (d) Most candidates were very vague when answering the impact of excess fertilisers in water resources on humans (Q11.4). Common errors were as follows:
- Only referring to the cause i.e. excess of nitrates in water or eutrophication, but not its effect on humans;
  - Only referring to the effect e.g. blue baby syndrome, but not to the cause i.e. excess nitrates in water;
  - Not linking excess fertilisers in water to humans e.g. many candidates wrote about the impact on marine life; and
  - Giving the definition of eutrophication as answer.

### Suggestions for improvement

- (a) More attention should be given to the topic on fertilisers. Learners should be encouraged to study the topic as they can obtain marks easily if they know their work.
- (b) Use flow diagrams in class to help learners to study the different reactions that form part of the fertiliser industry.
- (c) Give enough written work in the form of questions from previous papers to ensure that learners are exposed to the different types of questions on this topic.

### CONCLUSION

This incremental improvement in learner performance in 2013 is believed to be due to the sustained inputs into the basic education system over the last few years. The wide range of systemic interventions have been implemented and sustained through strong partnerships forged over time with the private sector, higher education institutions and civil society. Informed by the 2012 NSC examination results, targeted National and Provincial strategies have focused on specific challenges in low performing subjects.

Individual provincial intervention strategies focused on improving underperforming schools, providing teacher support, the development and dissemination of supplementary teaching and learning resources, the introduction of the innovative use of ICT to support the teaching of Mathematics and the sciences, the rollout of supplementary tuition, and assessment interventions to prepare the 2013 cohort for the NSC examination. Increasingly provinces, districts and schools are using the qualitative data presented in the National Diagnostic Report on Learner Performance, and information emanating from PED marking and remarking processes to strengthen their planning and development of relevant and responsive interventions that meet the specific learning needs of the FET learners.

Incremental improvements in learner performance indicates that the findings and recommendations in the diagnostic report are being used by the provinces to encourage reflexive practice among Grade 12 classrooms practitioners. School Management Teams, teachers, and subject advisors are therefore encouraged to make full use of this 2013 report in planning their teaching and learning interventions for 2014 especially with the rollout of CAPS for the 2014 cohort. This report should also be read in conjunction with the Curriculum Assessment Policy Statement and past question papers to effectively improve the quality of teaching, learning and assessment in each of the 11 subjects, and most importantly to improve the quality of the NSC passes in 2014.









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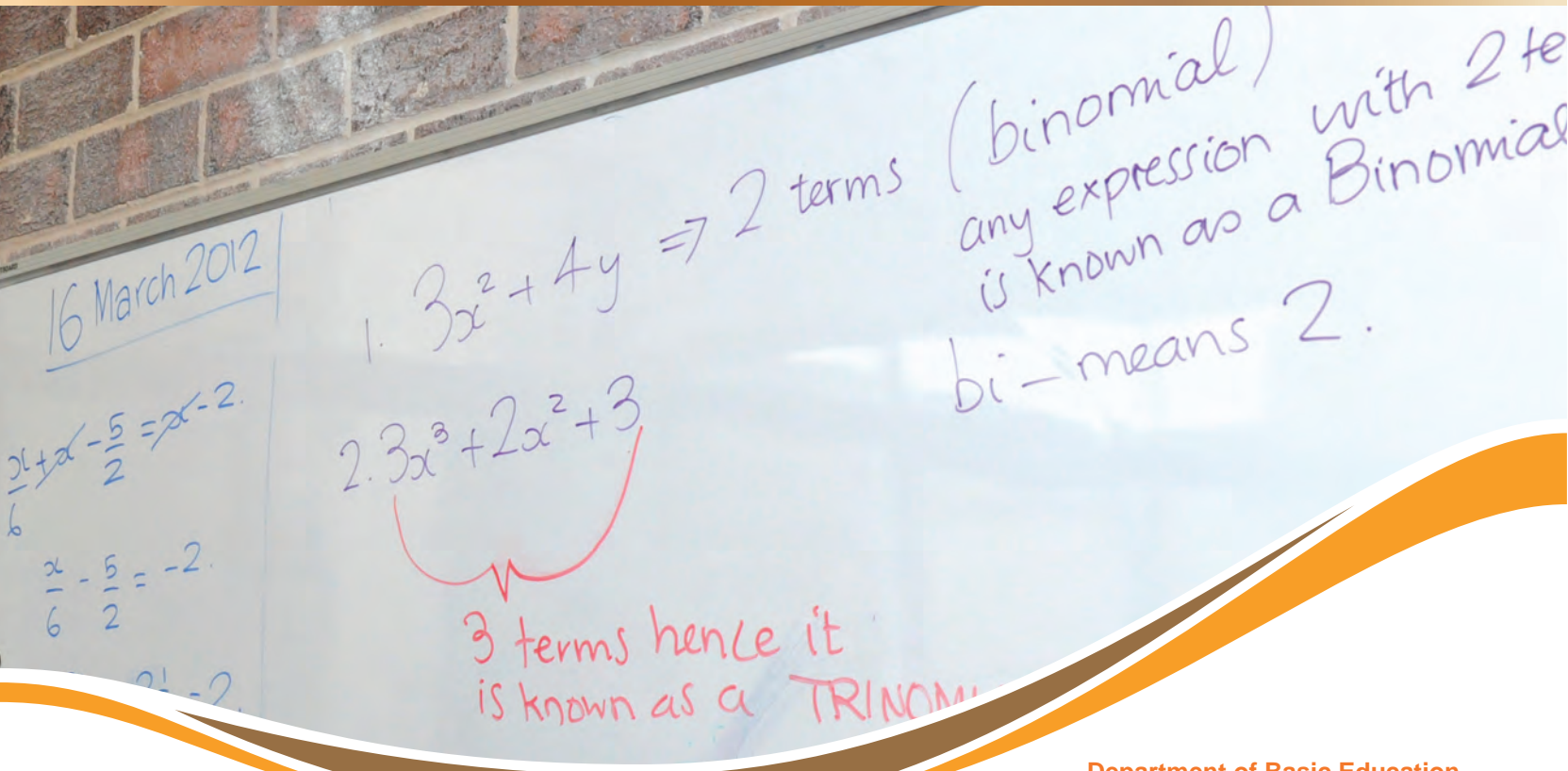
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