

# Consolidated Post-Exam Analysis Report 2014

Content Subjects - IEB

## Contents

Section 1: Background .....	2
Section 2: Subject Reports – Independent Examinations Board .....	14
2.1: Accounting – Independent Examinations Board .....	14
2.2: Business Studies – Independent Examinations Board .....	36
2.3: Economics – Independent Examinations Board .....	50
2.4: Geography – Independent Examinations Board .....	58
2.5: History – Independent Examinations Board .....	75
2.6: Life Sciences – Independent Examinations Board .....	86
2.7: Mathematics – Independent Examinations Board .....	98
2.8: Mathematical Literacy – Independent Examinations Board .....	109
2.9: Physical Sciences – Independent Examinations Board .....	129

## **Structure of the Report**

This report provides an overview of the results of the post-examination analysis project. This project is run in order to provide qualitative feedback to Umalusi's Assessment Standards Committee on the structure and quality of the National Senior Certificate final examinations. The process is one of the strands of results standardisation, and is also intended as a lever for improvement of the examinations year on year.

This report is divided into two sections. Section 1 provides the background information that informed the post-examination analysis project, and defines the terms that are used. It concludes with an overview of the methodology employed in the project.

Section two provides the reports generated by the post-examination analysis teams that detail their findings. The subject reports are presented consecutively in alphabetical order.

### **Section 1: Background**

In carrying out its mandate to set and monitor educational standards in the General and Further Education sector in South Africa, Umalusi must ensure that assessments of those qualifications that are registered in its sub-framework are of a satisfactory standard. To operationalize that, Umalusi performs quality assurance that supports the enhancement of the standard of instruments used to assess candidates in the sector. This includes, amongst others, evaluation and analysis of examinations as a means of setting standards within the education system. It is through such process that Umalusi is able to determine whether or not the results of its quality assured examination remain a valid predictor of performance and to develop an informed understanding of the cognitive demand, and more recently item difficulty, of the examinations associated with its qualifications.

The framework for working with item difficulty is intended to support all key role players in making complex decisions about what makes a particular question or item easy, difficult or moderately challenging for Grade 12 examination candidates. In other words, the framework is intended to address concerns about whether the examinations in question are defensibly adequate instruments.

To differentiate a large number of examination candidates into graded categories, examination results need to show a wide spread of marks rather than a skewed mark distribution. To accomplish this goal, examiners need to vary the difficulty of examination questions or tasks, and ensure that there are sufficient easy, moderate, and difficult questions that allow for high ability candidates to be discriminated from other candidates of lower ability. If all students achieve an A or B grade in an examination, results could be interpreted as reflecting high ability or proficiency on the part of all candidates. As it is highly unlikely that all candidates are 'above average', such results are more commonly an indication that the examination did not measure the entire range of levels of difficulty. Correspondingly, a high failure rate could be interpreted as reflecting low ability on the part of most candidates. As candidates usually possess a range of abilities, especially as the sample size

increases, a high failure rate likely indicates that the examination contained too many difficult questions.

It is important that a range of cognitive demands are made on students in Grade 12 examinations, and that examination papers are not only characterised by questions that require reproduction of information and replication of basic procedures. Questions that assess higher order processes, such as analysis, are *usually* more difficult than questions that assess lower order processes, such as recognition and factual recall (simple memory questions), hence higher level cognitive demands should not be under-represented in papers.

However, other factors besides the type of cognitive demand affect the level of difficulty of examination questions for Grade 12 students. We know this because questions that align to a particular type of cognitive demand are not always as difficult as other questions that align to the same cognitive demand. For example:

- a recall question that asks students to recall an abstract theory, or complex content is often much more difficult to accomplish than one which asks candidates to recall a simple fact (i.e. differences in content difficulty).
- a question that requires recalling an ordered sequence of events and which entails writing a few sentences is generally easier than one which involves the same type of cognitive demand but entails writing a whole essay (i.e. differences in 'writing difficulty').
- literal comprehension of source material comprising a simple contemporary magazine article is generally easier than literal comprehension of a classical work such as one of Shakespeare's dramas because of differences in the content, vocabulary, sentence and organisational structure, register, diction, literary techniques, abstractness of ideas and imagery, and background knowledge required (i.e. differences in 'reading difficulty').

We also know that a particular evaluation question may be more difficult for a typical Grade 12 student than for a university graduate. A question requiring inferential reasoning may be far more difficult for the average Grade 6 student than for the average Grade 12 student. With this in mind, Umalusi has developed the below framework for thinking about question difficulty.

### Levels of difficulty of examination questions

This question is assessed as:			
1	2	3	4
<b>Easy</b> for the ideal average Grade 12 student to answer.	<b>Moderately</b> challenging for the ideal average Grade 12 student to answer.	<b>Difficult</b> for the ideal average Grade 12 student to answer.	<b>Very difficult</b> for the ideal average Grade 12 student to answer. The skills and knowledge required to answer the

			question allows for A-grade students (extremely high-achieving/ability students) to be discriminated from other high ability/proficiency students.
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The *ideal* average learner is an intellectual construct that does not represent any individual South African learner. Rather it is envisioned as a learner that has received adequate tuition from a qualified teacher, has been taught the entire curriculum, and is of average intelligence. Essentially this construct is one that Umalusi uses to set the standard at which we understand appropriate examination difficulty – without reference to learners in any measured or aggregate sense.

Umalusi evaluators are tasked with using the above categories of question difficulties after using the framework for thinking about question difficulty below to inform their judgements. The four-category framework **for thinking about question or item difficulty** in the table that follows is adapted from Leong (2006) and comprises the following four general categories of difficulty:

1. Content (subject/concept) difficulty;
2. Stimulus (question) difficulty;
3. Task (process) difficulty; and
4. Expected response difficulty.

When you read the framework you will see that

- the **demands of the reading required** to answer a question forms an important element of 'Stimulus difficulty'.
- the **demands of the written** text or representations students are required to produce for their **response** form an important element of 'Task difficulty'.
- the **cognitive demand** of a question is another element of 'Task difficulty'.

The framework draws a crucial distinction between 'valid' and 'invalid' sources of question difficulty in each of the four general categories.

Valid difficulty or 'easiness' is intended by the examiner. Invalid sources of difficulty are defined as those features of question difficulty that were *not* intended by the examiner. **Invalid sources of question difficulty** prevent the question from assessing what the examiner intended, and **are those aspects of question difficulty that prevent candidates from demonstrating their true ability or competence**. The framework provides **examples** of possible invalid sources for each category. For example, grammatical errors in a question that could cause misunderstanding are invalid sources of question difficulty because the difficulty in answering the question lies in the faulty formulation of the question, rather than in the intrinsic difficulty of the

question itself. Students may misunderstand the question and therefore not be able to demonstrate what they know.

## Framework for thinking about question difficulty

### CONTENT/CONCEPT DIFFICULTY

**Content/concept difficulty** indexes the difficulty in the **subject matter, topic or conceptual knowledge** assessed or required. In this judgment of the item/question, difficulty exists in the **academic and conceptual demands** that questions make and/or the **grade level** boundaries of the various 'elements' of domain/subject knowledge (topics, facts, concepts, principles and procedures associated with the subject).

#### For example

Questions that assess 'advanced content', that is, subject knowledge that is considered to be in advance of the grade level curriculum, are *likely* to be difficult or very difficult for most candidates. Questions that assess subject knowledge which forms part of the core curriculum for the grade are *likely* to be moderately difficult for most candidates. Questions that assess 'basic content' or subject knowledge candidates would have learnt at lower grade levels, and which would be familiar to them are *unlikely* to pose too much of a challenge to most candidates.

Questions that require general everyday knowledge or knowledge 'real life' experiences are *often* easier than those that test more specialized school knowledge.

Questions involving only concrete objects, phenomena, or processes are *usually* easier than those that involve more **abstract constructs, ideas, processes or modes**.

Questions which test students' understanding of theoretical or **de-contextualised issues or topics**, rather than their knowledge of specific examples or contextualised topics or issues *tend* to be more difficult. Questions involving familiar, contemporary/current contexts or events are *usually* easier than those that are more abstract or involve 'imagined' **events** (e.g. past/future events) or **contexts** that are distant from students' experiences.

Content difficulty may also be varied by changing **the number of knowledge elements or operations assessed**. *Generally* the difficulty of a question **increases** with the number of knowledge elements or operations assessed. Questions that assess students on two or more knowledge elements or operations are *usually* (but not always) more difficulty than those that assess a single knowledge element or operation.

Assessing students on **a combination of knowledge elements or operations that are seldom combined** *usually* increases the level of difficulty.

### EXAMPLES OF INVALID OR UNINTENDED SOURCE OF CONTENT DIFFICULTY

- Testing obscure or unimportant concepts or facts that are hardly mentioned in the curriculum, or which are unimportant to the curriculum learning objectives.
- Testing advanced concepts or operation that candidates are extremely unlikely to have had opportunities to learn.

### STIMULUS DIFFICULTY

**Stimulus difficulty** refers to the difficulty of the linguistic **features of the question (linguistic complexity)** and the challenge that candidates face when they attempt to read, interpret and understand the words and phrases in the question AND when they attempt to read and understand in the **information or 'texts' or source material (diagrams, tables and graphs, pictures, cartoons, passages, etc.) that accompanies the question.**

#### For example

Questions that contain words and phrases that require only simple and straightforward comprehension are *usually* easier than those that require the candidate to understand **subject specific phraseology and terminology** (e.g. idiomatic or grammatical language not usually encountered in everyday language), or that require more technical comprehension and specialised command of words and language (e.g. everyday words involving different meanings within the context of the subject).

Questions that contain information that is tailored to an expected response, that is, that contain no irrelevant or distracting information, are *generally* easier than those that require candidates to select relevant and appropriate information or **unpack a large amount of information** for their response.

A question set in very rich context *can* increase question difficulty. For example, students *may* find it difficult to select the correct operation when a mathematics or accountancy question is set in a context-rich context.

Although the level of difficulty in examinations is *usually* revealed most clearly through the questions, text complexity or the degree of **challenge or complexity in written or graphic texts** (such as a graph, picture, cartoon, etc.) that students are required to read and interpret in order to respond *can* increase the level of difficulty. Questions that depend on reading and selecting content from a text *can* be more challenging than questions that do not depend on **actually reading the accompanying text** because they test reading comprehension skills as well as subject knowledge. Questions that require candidates to **read a lot** *can* be more challenging than those that require limited reading. Questions that tell students where in the text to look for relevant information are *usually* easier than those where students are not told where to look.

The level of difficulty *may* increase if texts set, and reading passages or other **source material** used are challenging for the grade level, and make **high reading demands** on students at the grade level. Predictors of textual difficulty include

- **semantic content** - for example, if vocabulary and words used are typically outside the reading vocabulary of Grade 12 students, 'texts' (passage, cartoon, diagram, table, etc.) are *usually* more difficult. 'Texts' are *generally* easier if words or images are made accessible by using semantic/context, syntactic/structural or graphophonic/visual cues.
- **syntactic or organisational structure** - for example, sentence structure and length. For example, if students are likely to be *familiar with the structure* of the 'text' or resource, for example, from reading newspapers or magazines, etc. 'texts' are *usually* easier than when the structure is unfamiliar.
- **literary techniques** - for example, abstractness of ideas and imagery - and **background knowledge required**, for example, to make sense of allusions.
- if the context is unfamiliar or remote, or if candidates do not have **access to the context** which informs a text (source material, passage, cartoon, diagram, table, etc.) they are expected to read, and which informs the question they are supposed to answer and the answer they are expected to write, then constructing a response is *likely* to be more difficult than when the context is provided or familiar (for example. if details about the originator/'producer' of source material are provided in history).

Questions which require students to cross-reference different sources are *usually* easier than those which deal with one source at a time.

Another factor in stimulus difficulty is presentation and visual appearance. For example, type face and size, use of headings, and other types of textual organisers etc. can aid 'readability' (Mobely, 1987 in Fisher-Hoch and Hughes, 1996) and make it easier for students to interpret the meaning of a question.

#### **EXAMPLES OF INVALID OR UNINTENDED SOURCES OF STIMULUS DIFFICULTY**

- Meaning of words unclear or unknown.
- Difficult or impossible to work out what the question is asking.
- Questions which are ambiguous.
- Grammatical errors in the question that could cause misunderstanding.
- Inaccuracy or inconsistency of information or data given.
- Insufficient information provided.
- Unclear resource (badly drawn or printed diagram, inappropriate graph, unconventional table).
- Dense presentation (too many important points packed in a certain part of the stimulus).

## TASK DIFFICULTY

**Task difficulty** refers to the **difficulty that candidates confront when they try to formulate or produce an answer.**

### For example

In most questions, to generate a response, candidates have to work through the steps of a solution. *Generally*, questions that **require more steps in a solution** are more difficult than those that require fewer steps. Questions involving only one or two steps in the solution are *generally* easier than those where several operations required for a solution.

Task difficulty may also be mediated by the **amount of guidance present in the question**. Although question format is not necessarily a factor and difficult questions can have a short or simple format, questions that provide guided steps or cues (e.g. a clear and detailed framework for answering) are *generally* easier than those that are more open ended and require candidates to form or tailor their own response strategy or argument, work out the steps and maintain the **strategy for answering** the question by themselves. A high degree of prompting (a high degree of prompted recall, for example) *tends* to reduce difficulty level.

Questions that test specific knowledge are *usually* less difficult than **multi-step, multiple-concept or operation questions**.

A question that requires the candidate to use a **high level of appropriate subject, scientific or specialised terminology** in their response *tends* to be more difficult than one which does not.

A question requiring candidates to **create a complex abstract (symbolic or graphic) representation** is *usually* more challenging than a question requiring candidates to create a concrete representation.

A question requiring writing a one word answer, a phrase, or a simple sentence is *often* easier to write than responses that **require more complex sentences, a paragraph or a full essay or composition**.

**Narrative or descriptive writing**, for example where the focus is on recounting or ordering a sequence of events chronologically, is *usually* easier than **writing discursively** (argumentatively or analytically) where ideas needs to be developed and ordered logically. In subjects such as history where one of the goals is that students learn to express themselves well (in English, etc.) and **writing skill** is part of what students are supposed to learn, some questions reflect expected response difficulty simply by 'creating the space' for A-grade candidates to demonstrate genuine insight, original thought or good argumentation, and to write succinctly and coherently about their knowledge.

On the other hand, questions which require continuous prose or extended writing may also be easier to answer correctly or to get marks for than questions that require no writing at all or single letter answer (such as multiple choice), or a brief response of one or two words or short phrase/s because they **test very specific knowledge**.

The **cognitive demand** or **thinking processes** required form an aspect of task difficulty. Some questions test thinking ability, and students' capacity to deal with ideas, etc. Questions that assess inferential comprehension or application of knowledge, or that require students to take ideas from one context and use it in another, for example, *tend* to be more difficult than questions that assess recognition or retrieval of basic information. Questions requiring recall of knowledge are *usually* more difficult than questions that require simple recognition processes.

When the **resources for answering** the question are included in the examination paper, then the task is *usually* easier than when candidates have to use and select their own internal resources (for example, their own knowledge of the subject) or transform information to answer the question.

#### **EXAMPLES OF INVALID OR UNINTENDED SOURCES OF TASK DIFFICULTY**

- Level of detail required in an answer is unclear.
- Context is unrelated to or uncharacteristic of the task than candidates have to do.
- Details of a context distract candidates from recalling or using the right bits of their knowledge.
- Question is unanswerable.
- Illogical order or sequence of parts of the questions.
- Interference from a previous question.
- Insufficient space (or time) allocated for responding.
- Question predictability or task familiarity. If the same question regularly appears in examination papers or has been provided to schools as exemplars, students are likely to have had prior exposure, and practised and rehearsed answers in class (for example, when the same language set works are prescribed each year).

#### **EXPECTED RESPONSE DIFFICULTY**

**Expected response difficulty** refers to difficulty imposed by examiners in a **mark scheme and memorandum**. This location of difficulty is more applicable to 'constructed' response questions, as opposed to 'selected' response questions (such as multiple choice, matching/true-false).

#### **For example**

When examiners expect few or no details in a response, the question is *generally* easier than one where the mark scheme implies that **a lot of details are expected**.

Another element is the **complexity in structure of an expected response**. When simple connections between ideas or operations are expected in a response, the question is *generally* easier to answer than a question in which the significance of the relations between the parts and the whole is expected to be discussed in a response. In other words, a question in which an unstructured response is expected is *generally* easier than a question in which **a relational response** is expected. A response which involves **combining or linking a number of complex ideas or operations** is *usually* more difficult than a response where there is no need to combine or link ideas or operations.

A further aspect of expected response difficulty is the **clarity of the allocation of marks**. Questions are *generally* easier when the allocation of marks is explicit, straight-forward or logical (i.e. 3 marks for listing 3 points) than when the **mark allocation is indeterminate or implicit** (e.g. when candidates need all 3 points for one full mark or 20 marks for a discussion of a concept, without any indication of how much and what to write in a response). This aspect affects difficulty because candidates who are unclear about the mark expectations in a response may not produce sufficient amount of answers in their response that will earn the marks that befit their ability.

Some questions are more difficult/easy to mark accurately than others. Questions that are **harder to mark and score objectively** are *generally* more difficult for candidates than questions that require simple marking or scoring strategies on the part of markers. For example, recognition and recall questions are *usually* easier to test and mark objectively because they usually require the use of matching and/or simple scanning strategies on the part of markers. More complex questions requiring analysis (breaking down a passage or material into its component parts), evaluation (making judgments, for example, about the worth of material or text, or about solutions to a problem), synthesis (bringing together parts or elements to form a whole), and creativity (presenting own ideas or original thoughts) are *generally* harder to mark/score objectively. The best way to test for analysis, evaluation, synthesis and creativity is usually through essays. Such essays *generally* require the use of more cognitively demanding **marking** strategies such as interpreting and evaluating the logic of what the candidate has written.

Questions where **a wide range of alternative answers or response/s** is possible or where the correct answer may be arrived at through different strategies *tend* to be more difficult. On the other hand, questions may be so open-ended that students will get marks even if they engage with the task very superficially.

### EXAMPLES OF INVALID OR UNINTENDED SOURCES OF EXPECTED RESPONSE DIFFICULTY

- Mark allocation is unclear or illogical. The weighting of marks is important in questions that comprise more than one component when components vary in levels of difficulty. Students may be able to get the same marks for answering easy component/s of the item as other students are awarded for answering the more difficult components.
- Mark scheme and questions are incongruent.
- Question asked is not the one that examiners want candidates to answer. Memorandum spells out expectation to a slightly different question, not the actual question.
- Impossible for candidate to work out from the question what the answer to the question is (answer is indeterminable).
- Wrong answer provided in memorandum.
- Alternative correct answers from those provided or spelt out in the memorandum are also plausible.
- The question is 'open' but the memo has a closed response. Memo allows no leeway for markers to interpret answers and give credit where due.

The above framework does not provide evaluators with explicit links between the different categories, or show relationships between the different concepts in the framework. This is because it is impossible to set prescribed rules or pre-determined combinations of categories and concepts for making judgements about where the difficulty in a particular examination question might lie.

The idea behind the framework is to allow evaluators to exercise their sense of professional judgement as a coherent whole. The complexity of the judgement task lies in an evaluator's ability as an expert to recognise subtle interactions and identify links between different elements of a question's difficulty or 'easiness'. For example, a question that tests specific knowledge can actually be more difficult than a multi-step question because it requires candidates to explain a highly abstract theory, or very complex content.

### **Methodology**

The post-examination analysis process consisted of gathering teams of subject experts to evaluate examination papers and memoranda based on an instrument developed by Umalusi.

Each subject team ideally consisted of:

- An academic working in the subject
- A subject advisor for the subject
- A teacher currently teaching the subject

In some cases it was not possible to gather a team that met all these criteria, but in general the above is an accurate representation of the Umalusi Post-Examination analysis team structure.

Before any analysis all teams were thoroughly trained either in group workshops or individually in order for a uniform understanding of the framework for assessing question difficulty to be built up. Once this was achieved, the teams were provided with the examination papers and memoranda required for analysis, together with the instrument and accompanying spreadsheet for them to capture the data required for analysis. Each team then met in mid-2014 to finalise their analyses for the 2012-2014 Exemplar examinations and write interim subject reports for submission to Umalusi.

After comments and feedback were provided, including inputs from members of Umalusi's Assessment Standards Committee, the teams then met within a day or so of the final 2014 examinations for their subject to analyse the final exams and construct final reports that incorporated previous feedback. The final reports were submitted to Umalusi, and an extraction of the data that is of particular relevance to the Assessment Standards Committee was undertaken to provide this digest report.

## **Section 2: Subject Reports – Independent Examinations Board**

### **2.1: Accounting – Independent Examinations Board**

**Subject:** Accounting

#### **Introduction**

This report provides an analysis of the National Senior Certificate (NSC) examination question papers for Accounting Grade 12. The Independent Examination Board (IEB) 2012, 2013 and 2014 Accounting examination papers were analysed to assess compliance with the IEB Assessment Guidelines, quality and standard of the examination papers.

Each team member initially worked through the examination papers individually. The data collected from the item-by-item analysis was plotted on an individual MS Excel spreadsheet. After the initial individual analysis, the team members met to compile a composite report and spreadsheet. In cases where the team members disagree about the selection of categories, it was extensively discussed by the team members until consensus was reached. During analysis, questions were classified in one of eight categories or types of cognitive demand. Within this category, each question was also classified according to levels of difficulty, that is, easy, moderate, difficult or very difficult. Sources of difficulty were also listed in the case of difficult questions. Justification for the source of difficulty was also provided. Data from the MS Excel spreadsheet was then used to compile a composite report.

#### **1. Compliance with the CAPS and/or relevant assessment body.**

##### **1.1 Format and structure**

In Table 1 below, the IEB Accounting papers that were analysed for 2012, 2013, and 2014 are presented.

<b>Exam paper</b>	<b>Focus area</b>	<b>Duration (hrs)</b>	<b>Mark allocation</b>
<b>IEB 2012 P1</b>	<b>(Application of Skills)</b>	2	200
<b>IEB 2012 P2</b>	<b>(Problem Solving and Analysis)</b>	2	100
<b>IEB 2013 P1</b>	<b>(Application of Skills)</b>	2	200
<b>IEB 2013 P2</b>	<b>(Problem Solving and Analysis)</b>	2	100
<b>IEB 2014 P1</b>	<b>(Application of Skills)</b>	2	200

<b>IEB 2014 P2</b>	<b>(Problem Solving and Analysis)</b>	2	100
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All the IEB Accounting examination consists of 2 papers. Paper 1 focuses on application of knowledge and theory totalling 200 marks and the duration is 2 hours. Paper 2 focuses on the analysis, evaluation and interpretation of the knowledge at totalling 100 marks and the duration is 2 hours. The mark allocation (300 marks) and duration (4 hours) of the examination papers combined complies with the suggestions in the IEB Assessment Guidelines.

The IEB 2014 papers comply with the requirements as specified in the IEB Assessment Guidelines as they cover the scope of the grade 12 curriculum: Financial Accounting, Managerial Accounting and Managing resources. The IEB 2014 papers comply with the examination requirements as set out by the IEB Assessment Guidelines with regard to the format and structure.

The Assessment Guidelines does not stipulate the number of questions per paper and the mark allocation per question. Like previous years examination papers, the IEB 2014 paper consisted of 4 questions in paper 1 and 3 questions in paper 2. All questions are compulsory and were to be answered in a specially prepared answer book.

Each exam paper consisted of the answer-book and the information booklet. There is no separate question paper as questions are only printed in the answer book.

It is stipulated in the Assessment Guidelines that all topics require integration of ethical issues and internal control. As a result of this stipulation ethical issues were found to be integrated in Question 3 and 4 of paper 1 (totaled 7 marks) and Questions 1 and 2 of paper 2 and (totaled 10 marks) while internal control was integrated in questions 3 and 4 of paper 1 and totaled 6 marks . There was no integration of internal control in any questions in paper 2.

The team noted that the paper includes the new content as specified in the Assessment Guidelines. Creditors Reconciliation was examined in Paper 2, question 3. Repurchase (buy-back) of shares was examined in Paper 1, question 1 only.

In the Assessment Guidelines it is stipulated that examinations should address problem-solving questions where learners are required to use critical and creative thinking and this is evident in paper 1, question 4 and paper 2, in all three questions were problem solving.

## 1.2 Cognitive demand weightings

With regard to addressing of cognitive levels, the Assessment Guidelines document stipulates a two-way split between Lower and Higher-order cognitive levels in a 60 – 40% split for combined papers, 65 to 70% and 30 to 35% for Paper 1 and 40 to 50% and 50 to 60% for Paper 2.

<b>Table 2- Comparison of cognitive demand weightings specified and the percentage for the IEB P1 and P2 2014 analysed</b>								
	Lower- order				Higher-order			
	Remember	Understand	Apply 1	Apply 2	Analyse 1	Analyse 2	Evaluate	Create
	<b>Paper 1</b>							
<b>Marks</b>	5	0	51	84	19	17	20	4
<b>%</b>	3%	0%	26%	42%	10%	9%	10%	2%
	<b>70%</b>				<b>30%</b>			
<b>Target</b>	<b>130 to 140 marks = 65 to 70%</b>				<b>60 to 70 marks = 30 to 35%</b>			
	<b>Paper 2</b>							
<b>Marks</b>	18	3	0	11	3	35	18	12
<b>%</b>	18%	3%	0%	11%	3%	35%	18%	12%
	<b>32%</b>				<b>68%</b>			
<b>Target</b>	<b>40 to 50 MARKS = 40 to 50%</b>				<b>50 to 60 MARKS = 50 to 60%</b>			

<b>Table 3- Comparison of cognitive demand weightings specified and the percentage for the IEB 2014 Combined (P1 and P2) analysed</b>								
	Lower- order				Higher-order			
	Remember	Understand	Apply 1	Apply 2	Analyse 1	Analyse 2	Evaluate	Create
	<b>P1 % P2 Combined</b>							
<b>Target</b>	<b>180 MARKS = 60%</b>				<b>120 MARKS = 40%</b>			
<b>Marks</b>	23	3	51	95	22	52	38	16
<b>%</b>	8%	1%	17%	32%	7%	17%	13%	5%
	<b>58%</b>				<b>42%</b>			

From table 2 and 3 above:

The IEB 2014 Paper 1 meets the target with 70% lower order and 30% higher order.

The IEB 2014 Paper 2 does not meet the target requirements as the lower order cognitive level is below the 40 to 50% target at 32% and the higher order cognitive level is higher than the 50 to 60% target at 68%. This implies that this paper is cognitively challenging.

The percentage of marks allocated to higher-order level is significantly higher while lower-order level questions are under-represented than stipulated in the IEB Assessment Guidelines. In the opinion of the team, this is acceptable as the focus of Paper 2 is on the analysis, evaluation and interpretation of the knowledge which is more cognitively challenging.

In terms of the required combined target of 60%:40% (Table 3), the IEB 2014 combined is fairly close to the recommended target at 58% and 42% respectively.

Analysis of these papers (combined) indicated that 49% of the marks were allocated to the application level type of questions. Although application level is heavily weighted, 32% of this level is advanced application. Questions in this level involve more in-depth processes where learners are asked to perform advanced accounting procedures. In Paper 1 Question 1 learners had to work backwards to find the amounts in the financial statements. In Paper 2 Question 1 learners had to know and apply ratios to work backwards to calculate figures.

18% of paper 2 was extremely challenging cognitively. In this level learners were required to use their innovative and creative abilities. In Paper 2 learners were required to apply theoretical knowledge (surface-type question) and to engage with financial information (deep-type questions) to identify and provide solutions.

### 1.3 Topic or content and/or skills area weightings

According to the IEB Assessment Guidelines there is no target for content coverage according to the fields of Financial Accounting; Managerial Accounting and Managing Resources. However, the team did analyse the IEB 2014 papers according to topics examined.

<b>Table 4- Topics examined in the IEB P1 2014</b>	
<b>Topic area</b>	<b>Marks</b>
Companies	61
Statement of Cash Flows	40
Analysis and interpretation of financial statements	22
Production cost statement & notes	31
Unit costs & break-even	6
VAT	12
Validate & calculation inventories - FIFO, Weighted average, Specific Identification.	15
Internal control & internal audit processes	6
Ethical behaviour & legislation - companies	7
<b>Total</b>	<b>200</b>

<b>Table 5 - Topics examined in the IEB P2 2014.</b>	
<b>Topic area</b>	<b>Marks</b>
Analysis and interpretation of published financial statements	37
Interpret reconciliations - bank, debtors, creditors, age-analysis	23
Cash budget - sole trader/company - analyse & interpret	23
Professional bodies & code of conduct	7
Ethical behaviour & legislation - companies	10
<b>Total</b>	<b>100</b>

What is evident from table 4 and 5 above is that while the papers allow the assessment of all topics presented in the IEB SAGs for Accounting (*breadth* of assessment), papers also provides ample opportunity to explore the use of higher cognitive responses (*depth* of assessment) in Paper 2. This is evident in Paper 1 which focuses on application of knowledge and theory at 200 marks and Paper 2 which focuses on the analysis, evaluation and interpretation of the knowledge at 100 marks.

Although main topics covered in Grade 12 syllabus were examined there were topics that were left out such as Company selected ledger accounts, Company Final accounts, Company Income Statement, Manufacturing concepts, short form

manufacturing income statement, projected income statement, movement of fixed assets.

#### 1.4 Coverage of examinable curriculum

Of the 24 examinable topics in the grade 12 syllabus, below is the number of topics which were examined in each paper the team analysed.

<b>Paper</b>	<b>No. of Topics examined</b>	<b>Percentage examined</b>	<b>Essential knowledge not examined</b>
<b>IEB 2012 Combined</b>	14	58%	<ul style="list-style-type: none"> <li>- Concepts - companies</li> <li>-Final accounts – companies</li> <li>-Concepts - GAAP &amp; IFRS</li> <li>-VAT</li> <li>-Manufacturing concepts</li> <li>-Short-form – manufacturing Income Statement &amp; notes</li> <li>-Interpretation and report on movements of fixed assets.</li> <li>-Perpetual &amp; periodic inventory systems</li> <li>-Projected Income Statement</li> <li>-Ethical behaviour</li> </ul>
<b>IEB 2013 Combined</b>	17	71%	<ul style="list-style-type: none"> <li>-Concepts - companies</li> <li>-Concepts - GAAP &amp; IFRS</li> <li>-Selected ledger accounts – companies</li> <li>-Accounting equation – companies</li> <li>-Financial statements - IS - companies</li> <li>-Manufacturing concepts</li> <li>-Perpetual &amp; periodic inventory systems</li> </ul>
<b>IEB 2014 Combined</b>	15	63%	<ul style="list-style-type: none"> <li>-Company selected ledger accounts,</li> <li>-Company Final accounts,</li> <li>-Company Income Statement,</li> <li>-Manufacturing concepts,</li> <li>-Short form manufacturing income statement,</li> <li>-Projected income statement,</li> <li>-Movement of fixed assets.</li> </ul>

From table 6 above, all papers (IEB 2012, 2013 and 2014) reflected a fairly good spread of questions across the topics in the curriculum. As the duration of the Accounting papers in total was 4 hours and 300 marks (Paper 1 was 2 hours 200 marks and Paper 2 was 2 hours 100 marks) , it is impossible for the examiner to examine all topics in the curriculum. The papers cannot accommodate all topics in the time allocated for this. The examiners are therefore selective because the curriculum is too broad.

The levels of complexity in Accounting are incorporated within topics across the grade. The range of skills progress from understanding concepts, recording information to analysis, interpretation and evaluation of the information. The main topics that are always assessed integrate knowledge and skills from other topics within the grade.

The following topics are usually not examined in the papers as stand-alone questions: Company ledger accounts, GAAP concepts, Company Final accounts, Short form-manufacturing Income Statement & notes.

Company ledger accounts are normally assessed internally at school level in either formative and/or summative assessments. It is not included in the examination paper because the assumption is that learners need knowledge and skills from ledger accounts to complete the financial statements and notes. Ethical behavior is examined usually by asking learners to assess a particular internal control issue.

To avoid double testing the Projected Income Statement is not usually examined together with a Cash Budget neither are Final Accounts examined with an Income Statement as the income statement is simply a logical format of these ledger accounts.

The team noticed that the IEB 2012 paper reflected only 14 topics (58% of the Grade 12 curriculum) as examinable content which was the lowest in terms of the papers analysed. This is due to the fact that 80 marks (27%) in Question 2, paper 1 was on preparation of Income Statement and notes to the Balance Sheet.

## **2. Quality of examination papers**

### **2.1 Invalid sources of question difficulty or ease.**

There were no questions that were assessed as having invalid sources of difficulty or of ease in all examination papers analysed.

## 2.2 **Format, structure and layout: technical issues**

### **Format**

The format of the IEB 2014 papers was clear and well set out compared to prior years. The information in most of the papers was structured in a logical way that should have facilitated the learners' thinking process. The requirements were clear and to the point.

While the format and instructions in the IEB papers was clear, the required could have been complicated by having to refer back and forth between the answer-book and the information booklet as the questions are only printed in the answer book.

The team is still of the opinion that the provision of a ratios and percentage formulae sheet by the IEB enables the learners to select which ratio to use based on the clues provided in the question and not on their understanding of why the particular ratio is being used.

### **Structure**

The IEB 2012, 2013 and 2014 papers all had seven questions. Paper 1 consisted of four questions and paper 2 three questions. These papers provided the learners with all the necessary information relevant to complete the required in the questions.

The team felt that there was not enough time for learners to complete paper 1 in all three of the IEB papers analysed. This was despite the answer book being structured and scaffolded in such a way where learners had to simply put in figures calculated from the given information in the correct place provided.

One of the key principles of accounting is for learners to be able to identify and recognise what elements are being affected by a transaction and how this transaction should have been recorded in the accounting records and presented on the financial statements. By providing extensive scaffolding in an answer book, this skill is lost and learners are simply required to calculate and place the value next to the element which has already identified for them. It was noted that the IEB answer books (particularly paper 1) provided more information in the frameworks and thus did not test these accounting concepts and principles appropriately in the accounting

records or on the financial statements. The team members' perception is that the reason for doing this was in order for the learners to be able to complete the papers within the time allocated.

The fact that in some cases the most difficult questions were placed at the end of the papers could be considered appropriate but learners who might have wasted time on the previous questions would not have been able to do justice to these questions which required more in depth reading and understanding than the others.

E.g. the IEB 2013 paper 1 Question 3 required learners to work backwards from the given ratios to complete the Cash Flow Statement – this was unfamiliar and learners might not then have had enough time to complete Question 4 which was the biggest question in terms of the marks allocated to it

In the opinion of the team learners generally battle to stick to the times allocated to complete each of the questions and if they struggle with questions early on in the paper they then do not have time to complete the more challenging or longer questions that are usually at the end of the paper. As a result of this, as a team we feel that learners might not perform to the level expected of them. Learners whose home language is not English were more likely to spend more time on reading and interpreting the information provided. A suggestion would be to provide more time to write these papers due to the issues mentioned above.

The language used was fairly simple, not discriminatory and appropriate for the large majority of learners. However we do note that the current updated terminology has not been used. A suggestion would be to use new terminology and in brackets refer to the old name e.g. **Balance Sheet** now called **Statement of Financial Position**.

The team found that the material provided in the information booklet was generally appropriate. Most of the information provided was necessary for the answering of each question but in some cases there was a large amount of background information and/or scenarios that had to be read before answering the questions that followed e.g. IEB paper 2. The time allocated to Paper 2 could then be considered adequate considering the amount of reading that is required.

In the team's opinion the mark allocation in some places was not consistent throughout the papers examined. E.g. IEB 2014 Paper 1 Question 3.1.3 the multiple choice question – the solution required students to calculate closing stock using FIFO which involved more than 2 steps; Question 4.1 under factory rent and insurance – more marks could have been allocated for complex calculations; 4.4 only 4 marks were allocated for a calculation that involved many process including taking into account a variance that second language learners might not have understood.

In the IEB 2014 Paper 1, the team felt that Question 3.2.1 and 3.2.2 should have been swapped around as the average weighted cost per unit (calculated in 3.2.2) was needed to calculate the answer required in 3.2.1. The answers calculated in 3.2.1 and 3.2.2 were used in 3.2.3 and 3.2.4 but accuracy marks were assigned to these amounts instead of method/consequential marks. In Question 2.5.2 and 3.2.1 of the IEB 2014 Paper 1 the marks allocated was 3 marks but on the marking guidelines there were only 2 marks given.

In paper 2 of the IEB 2014 paper Question 1.4.3 provision should be made in the marking guidelines if learners used the average stock in their calculation and not just the end of year stock value. In IEB 2014 Paper 2 marking guidelines there were two figures that were incorrect e.g. Question 2.3 (the collection in October should be R920 000) and 2.5 (the denominator should be R504 000).

There were no questions that were assessed as having invalid sources of difficulty or of ease in all examination papers analysed.

**The following questions are good models or effective questioning to include in future examinations:**

- IEB 2014 Paper 1: Question 1 and 4 are good but would have been better if the answerbook was less scaffolded.
- IEB 2014 Paper 2: Question 3.
- IEB 2013 Paper 2: Question 3.
- IEB 2012 Paper 1: Question 4. The question examined learners understanding of the different stock systems and stock valuations.

### 2.3 Rating the quality of examination papers

In terms of the quality of the exam papers the team assessed format and structure.

Table 7 - Ratings for the quality of examination papers	
EXAM PAPER	RATING THE QUALITY OF EXAMINATION PAPERS
IEB 2012 paper 1	<u>Good</u>
IEB 2012 paper 2	<u>Good</u>
IEB 2013 paper 1	<u>Good</u>
IEB 2013 paper 2	Good
IEB 2014 Paper 1	Good
IEB 2014 Paper 2	Good

### 3. Standard of the examination papers

#### 3.1 Levels of difficulty

Differences in ratings of difficulty levels between individual evaluators were resolved before writing the report. The reason for these differences is firstly the team members do not all have the same understanding of what the typical learner is or ought to be. Secondly two of the team members are working in the schooling environment so have a better understanding of what the teaching, learning and assessment challenges are in these environments.

	<b>1 E</b>	<b>2 M</b>	<b>3 D</b>	<b>4 VD</b>	<b>ID</b>
<b>IEB 2012 P1</b>	38%	35%	27%	0%	0%
<b>IEB 2013 P1</b>	37%	38%	25%	0%	0%
<b>IEB 2014 P1</b>	39%	26%	37%	0%	0%
<b>IEB 2012 P2</b>	29%	56%	15%	0%	0%
<b>IEB 2013 P2</b>	22%	66%	12%	0%	0%
<b>IEB 2014 P2</b>	16%	62%	22%	0%	0%
<b>IEB 2012 Combined</b>	35%	43%	22%	0%	0%
<b>IEB 2013 Combined</b>	32%	47%	21%	0%	0%
<b>IEB 2014 Combined</b>	31%	37%	32%	0%	0%

From Table 8 above, in terms of Paper 1 the IEB 2014 there was a balance between the marks allocated to easy and difficult questions. The paper was also the most difficult when compared to 2012 and 2013 Paper 1. The IEB Paper 1 2013 paper appears to be the least challenging with 25% difficult questions while the 2012 Paper 1 is the second less difficult at 27%.

In terms of Paper 2 the IEB 2014 paper was the most difficult with less easy questions while the IEB 2012 paper reflected more easy questions at 29%. Paper 2 2013 was the least difficult with more moderately difficult questions at 66%.

All Paper 2 exams tend to lean more on moderately difficult questions.

When combined the IEB 2014 paper is the most difficult and the 2012 paper is the easiest.

### 3.2 Example of a question at each level of difficulty

Most of the questions are not solely easy, medium or difficult but usually a combination of all three levels of difficulty. Where there are sub-questions with solely one level of difficulty the marks allocated are fairly small.

<b>Table 9- Example of a question at each level of difficulty</b>	
<b>Examples: IEB 2014 P1</b>	<b>Examples</b>
<b><u>EASY</u></b>	<b><u>Question 1.3 (22 marks out of a possible 44)</u></b> Slotting in the given figures into the correct places
	<b><u>Question 1.1 (5 marks)</u></b> All easy – selecting the correct answer from the given alternatives
<b><u>MEDIUM</u></b>	<b><u>Question 1.3 (7 marks out of a possible 44)</u></b> Calculation were less complex
	<b><u>Question 2.1 (3 marks)</u></b> All medium. Calculation of the interim dividends from figures provided
<b><u>DIFFICULT</u></b>	<b><u>Question 1.3 (15 out of a possible 44)</u></b> Complex calculations and adjustments
	<b><u>Question 3.2.1 (3 marks)</u></b> All difficult. Calculation of closing stock using FIFO
<b><u>VERY DIFFICULT</u></b>	

<b>Examples: IEB 2014 P2</b>	<b>Examples</b>
<b><u>EASY</u></b>	<b><u>Question 3.11 (2 marks out of possible 5)</u></b> Simple calculations
	<b><u>Question 1.1 (5 marks)</u></b> Matching columns
<b><u>MEDIUM</u></b>	<b><u>Question 3.8 (5 marks out of a possible 8)</u></b> Debtors reconciliation - how to correct errors and omissions
	<b><u>Question 1.4.5 (6 marks)</u></b> Evaluation of the liquidity situation
<b><u>DIFFICULT</u></b>	<b><u>Question 2.2 (3 marks out of a possible 8)</u></b> Complex calculations
	<b><u>Question 1.5.2 (4 marks)</u></b> Compliance with the King Code to an unknown situation
<b><u>VERY DIFFICULT</u></b>	

### 3.3 Difficulty of stimulus/source material

In Accounting stimulus is related to scenarios and background financial information that is provided for learners to be able to analyse and evaluate to answer questions. This stimulus requires the learners to understand subject specific terminology which contain financial information that is tailored to an expected response.

For the IEB papers, learners are provided with a separate source material booklet for additional information.

Source material in all six IEB papers for the three years under review is consistent with expected levels for Grade 12. What the team found is that questions contain no irrelevant or distracting information. In most cases learners know where in the text to look for relevant information.

The team identified stimulus that learners might consider difficult. In all six papers there were instances where learners had difficulty in responding because of the following reasons:

- Difficulty to interpret and understand information given
- Reverse calculations & a lot of reading
- Unpack a large amount of information for their response
- Select relevant and appropriate information from dense contextual information

<b>Table 10 - Examples of questions with difficult stimulus</b>		
<b>EXAM PAPER</b>	<b>QUESTION</b>	<b>JUSTIFICATION FOR DIFFICULT STIMULUS</b>
<b><u>IEB 2012 P2</u></b>	2.2	<b><u>Extract the relevant response from stimulus</u></b>
<b><u>IEB 2013 P2</u></b>	1.8.2	Extract the relevant response from stimulus
	3.4	Extract the relevant response from stimulus
<b><u>IEB 2014 P1</u></b>	<b><u>1.2</u></b>	<b><u>Due to impact of bank overdraft</u></b>
	<b><u>3.2.3</u></b>	<b><u>Impact of consequential marks</u></b>
	<b><u>3.2.4</u></b>	<b><u>Impact of consequential marks</u></b>
<b><u>IEB 2014 P2</u></b>	<b><u>2.5</u></b>	<b><u>Not enough information provided to comment properly</u></b>

2.4

Stimulus was confusing

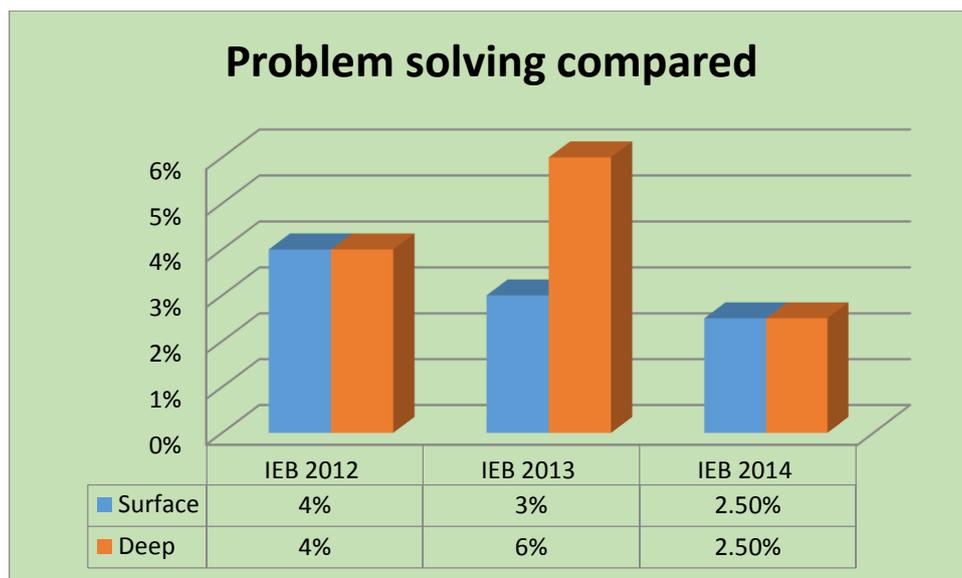
In the IEB 2014 Paper 2 stimulus was provided regarding Clover Dairy. The team felt that it would be difficult for rural students to relate to this.

### 3.4 Other points regarding the standard of the examination

#### Problem solving

According to the IEB Assessment Guidelines Paper 2 assesses theory, analysis, interpretation and problem solving. There is no stipulation in this guideline regarding how many marks are assigned to problem solving. Based on the analysis of the team, there were questions that address problem-solving of a deep and surface nature using critical and creative thinking.

**Comparison of problem solving questions for IEB**



IEB 2014 paper also reflected equivalent spread of marks for deep and surface problem solving 2, 5%. In the IEB 2014 paper 1 these questions came from 3.2.5 and 4.5 and from Question 2.6, 3.9 and 3.11 in Paper 2. Although Paper 2 was extremely challenging at 68%, there were no questions which require in-depth interaction with information in a question where the learners had to solve a real problem faced by the business

IEB 2013 papers included problem solving questions at 9% and these were predominantly of a deep nature. These questions came from Questions 2, 3 and 6 in Paper 2.

IEB 2012 paper reflects 8% problem solving questions. In Paper 2 the question on budgeting had the most problem solving type of questions at 20% of the total mark. The problem solving questions in Paper 1 might have been better placed in Paper 2 as the objective of the paper is problem solving and analysis

#### **4. Recommendations for improving the quality and standard of the examinations**

- The curriculum needs to be updated on a more regular basis to reflect current practice: Terminology relating to financial statements e.g. **Balance Sheet** now called **Statement of Financial Position**.
- In some cases there was a large amount of background information and/or scenarios that had to be read before answering the questions that followed. This hinders how fast learners can work, especially if English is not their home language. The team recommends that the number of readings that need to be done by the learners should be reduced.
- Ensure that the stimulus (background and information) provided is accurate and not confusing.
- The adequacy and accuracy of **marking memorandum** should be checked. Award method marks for calculation done and not just accuracy marks. Learners are unfairly penalised all the way through their answer when only accuracy marks are awarded and no consequential marks were given.

**The standard of the IEB 2014** papers was acceptable in terms of cognitive levels, levels of difficulty and coverage of the examinable content.

The format of the answer book has stayed the same, especially in Paper 1, in that learners do not have to apply their understanding of the concepts and principles as they simply calculate the amounts and place them on the answer sheet where all the identification of these principles and concepts had already been done for them.

The team considered the IEB 2014 papers (Paper 1 and Paper2) to be good model for future examinations in terms of their structure and layout.

## 5. Comparability of examination papers

### 5.1 Comparability of quality

The rating provided in the table below is based on the quality of the format, structure and layout of the papers as discussed in section 2.1 above.

<b>EXAM PAPER</b>	<b>OVERALL QUALITY OF 2014 PAPER COMPARED</b>
<b>IEB 2012 paper 1</b>	Equivalent
<b>IEB 2013 paper 1</b>	Equivalent
<b>IEB 2012 paper 2</b>	Equivalent
<b>IEB 2013 paper 2</b>	Equivalent
<b>IEB 2012 Combined</b>	<b><u>Equivalent</u></b>
<b>IEB 2013 Combined</b>	<b><u>Equivalent</u></b>

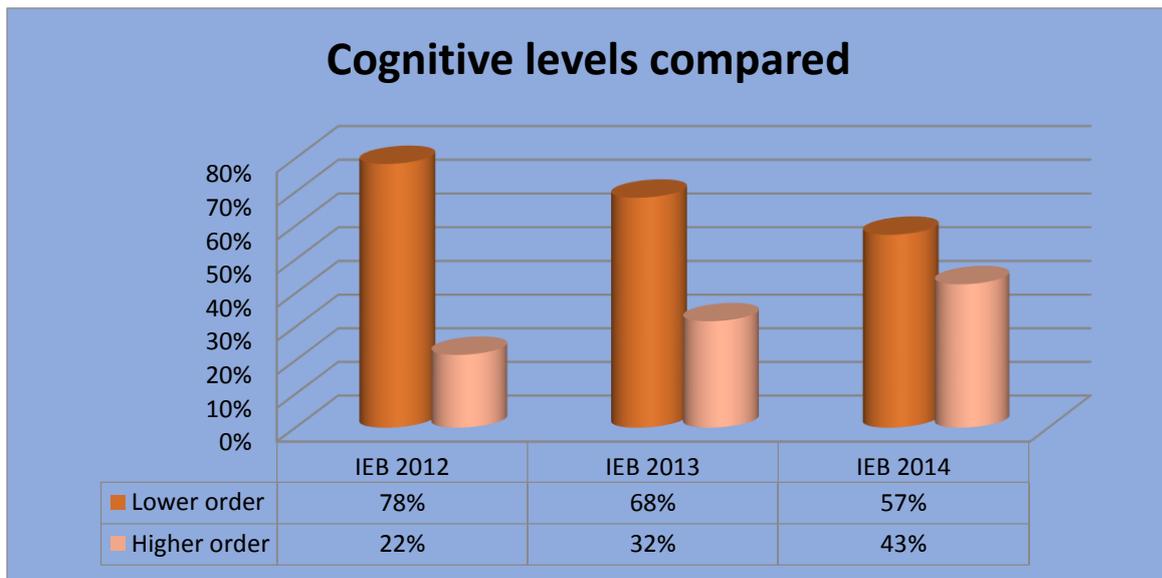
The format of the all examination papers was clear and well set out. The requirements were clear and to the point.

Material and information provided was generally appropriate and necessary for the answering of each question. However, there were some cases where there was a large amount of background information and/or scenarios that had to be read before answering the questions, especially in Paper 2 information booklet.

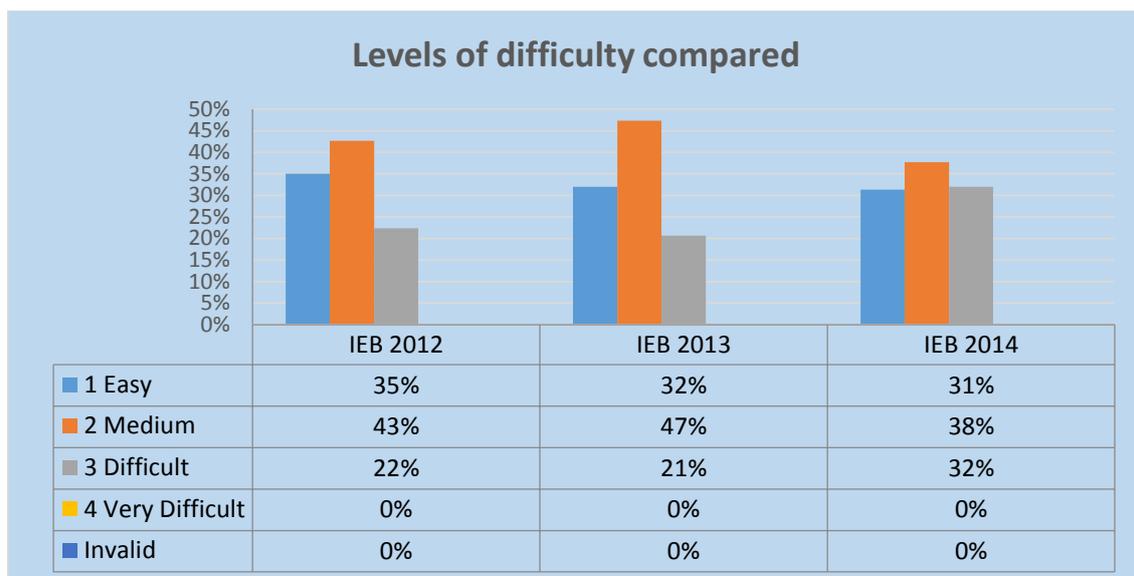
## 5.2 Comparability of standards

The following discussion is based on the information provided above and the data gathered in the spreadsheet.

***Comparing cognitive demand weighting for combined papers.***



***Percentage of marks awarded to the different levels of difficulty in the IEB (2012 to 2014) examination papers combined.***



The IEB 2012 and 2013 Paper 1 reflected 88% and 78% for lower-order levels which is above the target and 12% and 22% for higher-order levels which is below the target of 35%. Although the papers conform to the IEB's rationale for assessing the application of theoretical knowledge with a heavy emphasis on the preparation of financial statements, the papers were less challenging cognitively. The papers were also found to be less difficult.

The IEB 2012 Paper 2 reflected 60% on lower-order cognitive levels while 40% is reflected on higher-order cognitive levels. This does not meet the stated target of 50:50. The IEB 2013 and 2014 P2 are within the target while 2014 is regarded as the most challenging cognitively at 68%.

The IEB 2012 and 2013 Paper 2 were less difficult at 12% and 15% with more easy questions. 2014 P2 reflected less easy questions compared to other papers.

When combined IEB 2014 is considered to be fairly compliant with the required targets compared to other years. While the paper reflected more high-order questions, the paper is also significantly more difficult than the IEB 2013 and 2012 papers. This suggests that learners will experience the 2014 paper as significantly more challenging than the 2013 and 2012 papers. Hence the team believes that the overall performance in 2014 will decline when compared to the IEB 2012 and 2013 results.

Fewer learners at the bottom end of the scale will pass the 2014 paper compared to other previous papers while less A symbols will be achieved in 2014 due to the increase

in difficulty. In 2014 the average learner will attain lower marks than in 2013 and 2012 due to less easy and medium type questions in the 2014 paper.

## 2.2: Business Studies – Independent Examinations Board

### Subject: Business Studies

#### 1. Compliance with CAPS and/or relevant assessment body

##### A. Compliance with format and structure

###### (i) Names of examination papers

This report provides an analysis of the Independent Examination Board examination question papers for Business studies Grade 12 (herein referred to as IEB papers). IEB November 2012 Paper 1 and 2; IEB November 2013 Paper 1 and 2, and November 2014.

##### 1.1 Format and structure

The format and structure of the 2014 IEB paper complies with the requirements of the Business Studies IEB National Senior Certificate Handbook: Grade 12, 2014, which suggest Two papers: **Paper 1 – 2** hours of 200 marks divided into two sections: For **Paper 1 Section A** (50 marks) all questions are compulsory and consists of different types of questions, e.g. multiple choice, true or false, matching columns and terminology. This section allow for different questions to count different marks, e.g. a true answer may only count 1 mark but a false answer with a reason/correction of the statement may count 2 or 3 marks. **Section B** (150 marks) this section consist of THREE questions of (50 marks each). Shorter types questions, e.g.list, explain and discuss. Case studies or sources based questions in which candidates are expected to use these to demonstrate that cognitive skills across the spectrum have been mastered.

For **Paper 2** focus is on problem solving and analysis (2 hours of 100 marks). The focus is based on the scenarios which lend themselves to higher cognitive questions, while still allowing for lower order thinking to be examined. The responses required are longer in nature and rubrics, together with marking guidelines, which is used to assess these answers.

**Paper 1** focus to greater extent on assessing theoretical knowledge which underpins the understanding and application thereof. **Paper 2** involve the analysis and interpretation of casestudies, and for example, the writing of reports and solving of problems that requires critical and creative thinking. Despite the theory that underpins the answering of this paper, it demands more time and necessitates the higher time mark ratio allocated.

**TABLE: 1.1 Format and Structure**

NAME	FOCUS/TOPIC	NUMBER	LENGTH
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	<b>TOPIC:4</b> BUSINESS OPERATIONS  <b>TOPIC1:</b> BUSINESS ENVIRONMENTS  <b>TOPIC2:</b> BUSINESS VENTURES  <b>TOPIC3:</b> BUSINESS ROLES  <b>TOPIC:4</b> BUSINESS OPERATIONS	2	2
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## 1.2 Cognitive demand weightings

According to the Business Studies Independent Examination Board National Senior Certificate Handbook: Grade 12, 2014, the mark allocation per cognitive level encompasses: Knowledge 30%, Understanding 15%, Application 15%, Analysis 10%, Synthesis 10% and Evaluation and Problem solving 20%.

For the purpose of analysis cognitive levels were combined as follows: Knowledge and Understanding (level 1 and 2), Application and Analysis (level 3 and 4) and Synthesis and Evaluation and Problem Solving (level 5 and 6).

**Table: 1.2 Comparison of cognitive demand weightings specified and percentages for the paper(s) analysed**

PAPER	Cognitive level		
	L1 & L2 Knowledge and Comprehension	L3 & L4 Application and Analysis	L5&L6 Synthesis and Evaluation
IEB:2012 (PAPER 1 and 2)	44%	30%	26%
IEB:2013 (PAPER 1 and 2)	45%	55%	0%

IEB:	68%	11%	21%
November 2014 (PAPER 1 and 2)			

According to the team's analysis the IEB November 2014 paper indicates cognitive demand levels as indicated above which are categorised as knowledge and comprehension 45%; application and analysis 25%; synthesis and evaluation 30%.

The paper deviate from the required weighting in this regard the paper cognitive demand weightings for knowledge and comprehension (i.e. L1 & L2) has increased by 23% ,for application and analysis (i.e. L3 & L4) has decreased by 14%, and for synthesis and evaluation (i.e. L5 % L6) has decreased by 9%.

**TABLE 1.3. Comparison of topic or content and/or skill weightings specified with the weightings for the examination paper**

	MAIN TOPICS			
PAPER	TOPIC 1: BUSINESS ENVIRONMENTS	TOPIC 2: BUSINESS VENTURES	TOPIC 3: BUSINESS ROLES	TOPIC 4: BUSINESS OPERATIONS
IEB	25%	25%	25%	25%
November 2014: Paper 1 & 2	31%	12%	17%	40%

According to the analysis, the topic Business Environment and Business Operations have weightings above the stipulated weighting. Business Environment has 31%, 6% above and Business Operations 40%, 15% above. Topics Business Ventures and Business Roles are weighting below the stipulated weighting. Business Ventures 12%, 13% below and Business Roles 17%, 8% below. There is a significant deviation, from the specified weightings either below or above.

## 1.4 Coverage of Examinable curriculum

The examination papers adequately covers all the essential examinable components of the curriculum. There are questions in connection with all FOUR (4) Main Topics in section A, B and C of the question paper. The Examination Guidelines (2014) informs the essential examinable components which are the four main topics i.e. Business Environments, Business Ventures, Business Roles and Business Operations. The weighting is 25% for each topic.

The following table it shows the percentages of how the four main topics were covered:

**TABLE 1.4 Coverage of examinable curriculum**

<b>PAPER</b>	<b>TOPIC/LO 1 Business Environments</b>	<b>TOPIC/LO 2 Business Ventures</b>	<b>TOPIC/LO 3 Business Roles</b>	<b>TOPIC/LO 4 Business Operations</b>	<b>RATING</b>
IEB:2012 Paper 1 & 2	25%	28%	23%	24%	<b>100%</b>
IEB: 2013 Paper 1 & 2	25%	24%	24%	27%	<b>100%</b>
IEB: 2014 Paper 1 & 2	31%	17%	12%	40%	<b>100%</b>

All examination papers were able to cover the broad spectrum of the examinable curriculum for Business Studies Grade 12 in all four main topics. All essential knowledge were covered in all these papers and examinable components were covered through different types of questions. According to the Business Studies IEB National Senior Certificate Handbook: Grade 12, 2014. All Four (4) Main topics should cover 25% of each topic. However, the analysis indicates that Business Roles across years is insignificantly falling short of meeting the maximum coverage of 25%. For the 2014 Papers 1 & 2 the bulk of weighting is towards the Business Operations, followed by Business Environments and Business Ventures. According to the analysis team there is a significant deviation in 2014 Papers weightings across the main topics.

In terms of the skills the examination paper appeals to the cognitive and empirical skills. Examples of cognitive skills include analysis, interpretation, evaluation and development of strategies etc. Empirical skills covered are calculations and presentations (written

## 1.5 Other points regarding compliance with assessment requirements

All compliance issues regarding specified assessments requirements were met in all examination papers assessed. Starting from the types of questions in Paper 1, that is different types of questions, multiple-choice, matching columns and terminology. Section B: shorter type questions, list, explain and discuss, case studies or source based questions. For Paper 2, which focus on the scenarios which lend themselves to higher cognitive questions, while still allowing for lower order thinking. Papers 2 have longer/essay types questions and the essay-type long questions in demanded higher cognitive questions where insight and interpretation of theoretical knowledge is tested.

## 2. QUALITY OF EXAMINATION PAPERS

The structure of the examination question papers complies with the Business Studies IEB National Senior Certificate Handbook: Grade 12, 2014. The language is accessible and of acceptable standard. The average learner would be able to pass both question papers.

The format and structure complies with the Business Studies IEB National Senior Certificate Handbook: Grade 12, 2014, which shows that **Paper 1** focus to greater extent on assessing theoretical knowledge which underpins the understanding and application thereof.

**Paper 2** involve the analysis and interpretation of casestudies, and for example, the writing of reports and solving of problems that requires critical and creative thinking. Despite the theory that underpins the answering of this paper, it demands more time and necessitates the higher time mark ratio allocated.

**Overall impression of the quality of each years examination papers** (i.e. format, structure and layout).

The structure of the question paper complies with the suggested outline according to the IEB guidelines. The quality of the question paper was good but questions 5.1.2 and 6.5 were a little bit difficult for 2012 paper. However, for IEB 2013 the quality of the question paper was good but questions 5.2.2 (a), 5.2.2 (b), 6.1.3, 6.1.5, 6.5.3 and 6.6 and were a little bit difficult for the learners to understand. For November 2014 IEB

papers, the structure and format of papers were up to standard and of good quality, but the papers were difficult and other questions having sources of invalid difficulty.

## 2.1 Invalid sources of question difficulty or ease

### NUMBER OF QUESTIONS ASSESSED AS HAVING INVALID SOURCES OF DIFFICULTY/ OF EASE:

PAPER	DIFFICULTY	EASE
IEB: 2012(P1 AND P2)	7	
IEB:2013 (P1 AND P2)	7	
IEB: November 2014 (P1 AND P2)	18	

Explanation of invalid sources of difficulty according to the analysis of the team:

#### IEB: 2014 Paper 1

- Question 3.2.1: The question assess advanced content which tests candidates contents of theoretical issues and they have to apply to a particular context
- Question 3.2.2: The question assess advanced content which tests candidates contents of theoretical issues and they have to apply to a particular context
- Question 3.2.3: The question assess advanced content which tests candidates contents of theoretical issues and they have to apply to a particular context
- Question 3.2.4: The question assess advanced content which tests candidates contents of theoretical issues and they have to apply to a particular context
- Question 3.5.2: The question assess advanced content which tests candidates contents of theoretical issues and they have to apply to a particular context
- Question 3.5.3: The question assess advanced content which tests candidates contents of theoretical issues and they have to apply to a particular context
- Question 4.2: The question is set in a very rich context which can increase question difficulty
- Question 5.2: The question assesses two knowledge operations

- Question 5.6: The question assess advanced content which tests candidates contents of theoretical issues and they have to apply to a particular context

### IEB: 2014 Paper 2

- Question 1: The question has to unpack a large amount of information in the memorandum. Memorandum spells out expectation to a slightly different question, not the actual question
- Question 1: The question is varied by the change in the number of knowledge elements assessed. Candidates have to use and select their own internal resources. Level of detailed required in an answer is unclear
- Question 2: The question tests candidates understanding of theoretical issues or topics rather than their knowledge of contextualised topics or issues
- Question 2: The question tests candidates understanding of theoretical issues or topics rather than their knowledge of contextualised topics or issues

## 2.2 Other points regarding the quality of the examination

The language level of all the papers are of an acceptable standard and the format of the questions are also in line with the Business Studies IEB National Senior Certificate Handbook: Grade 12, 2013 and 2014. The contextualization of questions is in line with the guidelines that dictates that **Paper 1** should focus to greater extent on assessing theoretical knowledge which underpins the understanding and application thereof.

**Paper 2** involve the analysis and interpretation of casestudies, and for example, the writing of reports and solving of problems that requires critical and creative thinking. Despite the theory that underpins the answering of this paper, it demands more time and necessitates the higher time mark ratio allocated.

However, the adequacy, relevancy and accuracy of the marking guideline memorandum is too open with little guidelines of how marks or scores should be distributed.

## 2.3 Rating the quality of examination papers

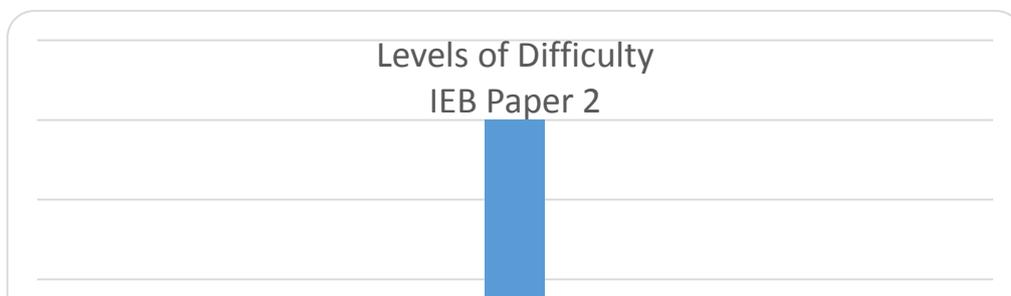
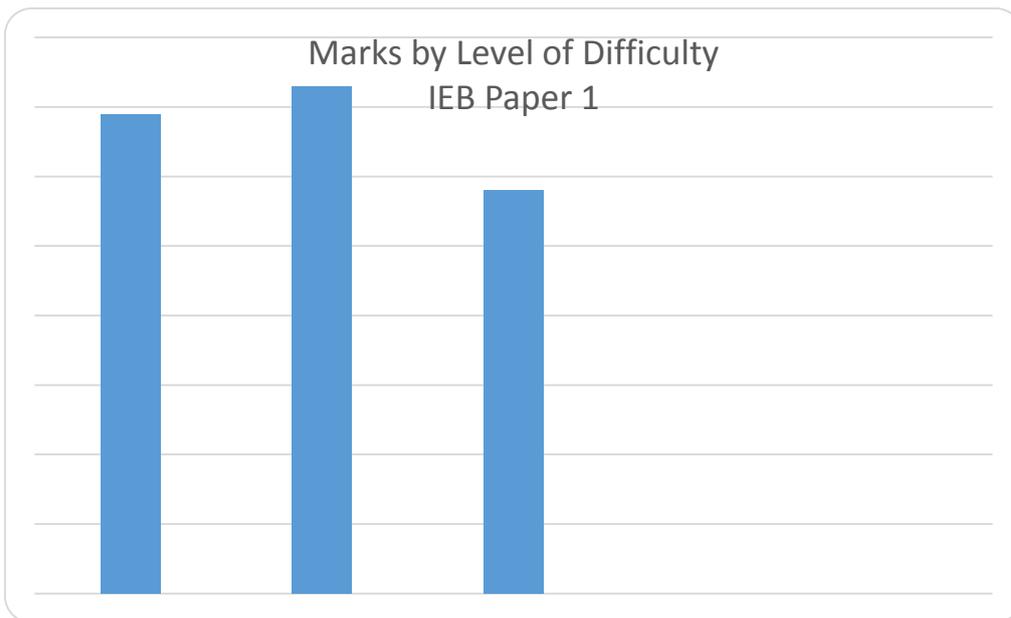
PAPER	Very Poor	Poor	Good	Very Good	Excellent
IEB: 2012 (P1 and 2)			✓		
IEB: 2013 (P1 and 2)			✓		
IEB: 2014 (P1 and 2)			✓		

### 3. STANDARD OF THE EXAMINATION PAPERS

#### 3.1 Levels of difficulty

Percentage of marks awarded to different levels of difficulty in examination papers

PAPER 1&2	EASY	MODERATE	DIFFICULT	VERY DIFFICULT	Invalid
IEB:2012	29	27	36	8	
IEB:2013	24	30	44	2	
IEB: November 2014	21	22	41	8	8



For the purposes of this analysis the levels of difficulty are categories as: easy, moderate, difficult, very difficult and questions having sources of invalid difficulty.

The 2012 analysis indicates a fairly distributed questions in terms of levels of difficulty with 36% of difficult questions, which shows a significant margin 9% between difficult and very difficult questions. For the 2013 questions were skewed towards the difficult level with a significant margin of 14% between moderate and difficult questions.

The 2014 November IEB papers shows a significant shift of questions in the following categories: Difficult weighting: 41%, Very Difficult weighting: 8% and Invalid sources weighting: 8%. The margin between moderate and difficult questions is significant at 19%. The analysis team can therefore conclude that both Paper 1 & 2 of 2014 November were difficult for an average learner.

### **3.2 Examples of questions at each level of difficulty**

PAPER	LEVELS OF DIFFICULTY			
	EASY	MODERATE	DIFFCULT	V.DIFFICULT
<b>IEB: November 2014</b>				
Question: 2.4	✓			
Question: 3.4.5	✓			
Question: 4.4.1		✓		
Question: 5.3.1		✓		
Question: 5.6			✓	
Question: 5.2			✓	
Question: 1 Paper 2				✓

### Examples of questions at each level of difficulty

Choose the most correct answer from the possible terms/words provided in the *Business Dictionary* below for the statements/explanations that follow. Write down the **most correct answer** next to the number on the supplied Answer Booklet.

**NOTE: There is only one correct answer for each statement.**

#### Business Studies Dictionary

Psychological Pricing Synergy

Sustainability Laissez-faire

Insider Trading Probation

Autocratic Excess clause

Divesture Strategy Average clause

Mediation Labour Relations Act

Arbitration Benchmarking

Basic Conditions of Employment Act Liquidation

The Economic Principle Retention of staff

Compensation for Occupational Injuries Johannesburg Securities

**Question 2.4:** A management style where workers are informed as to what objectives must be achieved, but managers do not get involved in telling workers how to achieve these

objectives

**Question 3.4.5:** Give **ONE** objective of the JSE Social Responsibility Index.

**Question 4.4.1:** List and describe a technique that the HR department of Pick n Pay could

use to complete manpower planning.

**Question 5.3.1:** Discuss the impact of the Consumer Protection Act on Pick n Pay's marketing department

**Question 5.2:** Describe TWO challenges that customers could place on the profits of Pick n Pay. In each case suggest a suitable strategy that Pick n Pay would need to implement to

overcome the challenge

**Question 5.6:** Evaluate Raymond Ackerman, Executive Chairman and Founder (1967 – 2010) of Pick n Pay, as a successful entrepreneur.

### **QUESTION 1 Paper 2:**

#### **Required:**

You have recently seen an advertisement in the newspaper where Pick n Pay is advertising for a consultant to help them to manage conflict and promote ethical behaviour in the Pick n Pay retail environment. You feel that you are very well qualified for the position, as you have recently resigned as National Manager of one of Pick n Pay's competitors.

In order to be appointed as the consultant, you have to write a

business report to the Pick n Pay Board of Directors in which you focus on the following two

issues:

- possible reasons for conflict in a retail environment and suggestions on how this conflict could be resolved;
- a discussion on how responsible and ethical business practice should be conducted in Pick n Pay in order to prevent and/or solve some of the ethical issues that you experienced in your previous position. These may include (but are not limited to) issues on labour relations, unethical advertising and corruption.

### **3.3 Number of stimulus/source material analysed**

	EASY	MODERATELY CHALLENGING	DIFFICULT
--	------	------------------------	-----------

IEB: 2012 Paper 1 & 2	2	3	
IEB: 2013 Paper 1 & 2	2	4	
IEB: 2014 Paper 1 & 2	2	5	1

Numbers of sources material are drawn from case studies used in both papers. The language used is accessible for an average learner and the length of of stimulus sources is relatively average and not too lengthy or condense with information. Both papers use one theme in this case they used Pick n Pay as the central theme for all stimulus sources. Sources E used in Paper 2 could be challenging for learner because they are expected to do calculation of profits and candidates are expected to write a business report to the Board of Directors of Pick n Pay in which you assess the factors to be considered when analysing the quality of performance of the different business functions and external environment of Pick n Pay. Also make recommendations on how to improve the overall

performance of the business.

### **3.4 Other points regarding the standard of the examination**

Generally both IEB Papers for November 2014, questions were fair spread in terms of level of difficulty, meaning the papers try to include each level of difficulty. However, the weighting between moderate questions and difficult questions is significant at 19%. The analysis team can therefore conclude that both Paper 1 & 2 of 2014 November were difficult for an average learner. Both the 2014 examination question paper 1 & 2 complies with the Business Studies IEB National Senior Certificate Handbook: Grade 12, 2014. The language is accessible and of acceptable standard.

## **4. Recommendations for improving the quality and standard of the examinations**

The following is recommended:

- That both papers (i.e. Paper 1 and 2) should not be incline towards application and problem solving. The examiners should strike a balance on all levels of cognitive demand.
- That stimulus sources should be relevant to the questions, the IEB papers use one theme, which is Pick n PAY for 2014 paper 1 & 2 examination, but some sources used were irrelevant to questions. To cite examples of sources in Paper 2 (Sources A, B, C and D) all were irrelevant.
- That different sources be sued to different questions for relevancy and appropriateness.

- That the Memorandum should not be too open, if the marking guideline could map out what is expected and how scores will be distributed in terms of knowledge operations
- That candidates use one Answer Booklet, the way the examination is designed now students are expected to answer in two separate answer sheets for Paper 1, which the analysis team suspect it might be confusing for an average learner.

### **Good model for future examinations (use)**

- Most questions in the IBE November 2014 papers can be used in future and all FOUR main topics are covered in all sections and in both papers
- The format and structure of the IBE November 2014 papers is a very good model for future use especially Paper 1, that consist of Section A: which consists of different types of questions, e.g. multiple choice, true or false, matching columns and terminology and Section B: which consist of questions of shorter types questions, (e.g. list, explain and discuss). Average learners have a good chance to pass the examination.

## **5. Comparability of examination papers**

### **5.1 Comparability of quality**

<b>PAPER</b>	<b>RATINGS</b>
IEB 2012 paper 1 & 2	Good
IEB 2013 paper 1 & 2	Good
IEB 2014 paper 1 & 2	Good

The analysis team has rated all papers from 2012 – 2014 as good papers in all respect in terms of standard and quality. However, we highlight the use of source material and its relevancy to the questions, and urge for the specificity of the marking guideline in terms of distribution of scores.

### **5.2 Comparability of standards**

The standard of the IEB papers for 2014 is consistent taking a good shape as compare to previous examination papers. However, we recommend an equal distribution of cognitive demand as specified in the Business Studies IEB National Senior Certificate Handbook: Grade 12, 2014 (i.e. knowledge and understanding = 45%, application and analysis = 25%, and synthesis and problem solving = 30%).

## 2.3: Economics – Independent Examinations Board

### Subject: IEB ECONOMICS

#### Introduction

This Post-exam analysis report presents the findings of the team of evaluators for the subject Economics.

The team leader led a discussion and review of the instrument and its application in an attempt to maintain consistency with the instruments application.

A rigorous analysis procedure that entailed a careful scrutiny of the examination question papers as well as the marking memoranda was undertaken. Each team member first conducted an independent individual analysis of each paper. The team then engaged a question by question interrogation. Each item was carefully evaluated and notes were made with regard to uncertainty, ambiguity and prejudice.

A fine-grained analysis of each item was conducted to ascertain its appropriateness, clarity, suitability, cognitive demand, level of difficulty, as well instances of invalid difficulty. The marking memorandum provided was also used to inform the analysis and classification of each question. There were instances where team members disagreed on the classification of certain questions. The team leader allowed members to argue requesting clear justification for the claims they had made about certain questions. These deliberations provided useful insights as to how different questions might be interpreted by learners. In many cases the marking memorandum provided evidence of the cognitive level that was being assessed.

#### 1. Compliance with the CAPS and/or relevant assessment body.

##### 1.1 Format and structure

The following table indicates the examination papers that were analysed.

Table1: Examination papers under analysis

<b>Paper</b>	<b>Marks</b>	<b>Duration</b>
IEB 2012	300	3hrs
IEB 2013	300	3hrs
IEB 2014	300	3hrs

The IEB sets one composite paper which complies with the assessment guidelines of the IEB.

The format and structure are in order.

## 1.2 Cognitive demand and weightings

In table 2 below a comparison of the cognitive demand weightings of the 2014 paper and the specifications of the CAPS is presented.

Table 2: Comparison of cognitive demand weightings

<b>Cognitive demand</b>	<b>CAPS %</b>	<b>IEB 2014</b>
<b>L1 and L 2</b>	30%	<b>53%</b>
<b>L3 and L4</b>	40 %	<b>38%</b>
<b>L5 and L 6</b>	30 %	<b>9%</b>

From the above table it can be seen that the percentage distribution of questions across the cognitive levels is a marked deviation from the prescribed expectations of the CAPS and the IEB assessment guidelines. The IEB distribution is 53:38:9, also a loading at cognitive levels 1 and 2, at the expense of cognitive levels 5 and 6.

## 1.3 Topic or content and/or skills area weightings

In the table below, the topic weightings are provided. The economics curriculum is divided equally into 4 broad topic areas with each topic area allocated 25% of the total.

Table 3: Comparison of the topic or content and/or skill weightings specified with the weightings for the examination paper(s)

<b>Topic/Content</b>	<b>CAPS %</b>	<b>2014 IEB</b>
<b>Macro Economics</b>	<b>25%</b>	<b>43%</b>
<b>Micro Economics</b>	<b>25 %</b>	<b>33%</b>
<b>Economic Pursuits</b>	<b>25 %</b>	<b>8%</b>
<b>Contemporary Economic Issues</b>	<b>25%</b>	<b>16%</b>

The IEB paper has allocated only 8% to “Economic Pursuits” as a major section, 17% lower than the prescribed 25%, and 16% allocated to “Contemporary Issues”, 9% lower than the prescribed 25%. This is likely to disadvantage learners who would be expecting an even distribution (25%) across all four major topic areas in the economics curriculum.

## 1.4 Coverage of examinable curriculum

Table 4 presents data on the coverage of examinable curriculum in each paper.

Examination papers	100% coverage	90-100%	80-89%	70-79%	Under 70%
IEB November 2014				x	

The IEB paper covered between 70-79% of the curriculum. Key topic areas such as Tourism, Environment sustainability and Development policies were not covered adequately in the IEB examination paper.

## 2. The quality of the examination papers

### 2.1 Invalid sources of question difficulty

Table 5: Invalid sources of difficulty

IEB	<p>2.1.3 using your answer from Question 21.2, calculate.... (3)</p> <p>3.3.2 .... Assess the effect the change in price depicted in the graph you drew in Question in 3.3.1</p> <p>3.4.2 What does your answer indicate about the relationship between the two products. (2)</p> <p>4.2.3To the best of you advantage ..... (2)</p>	<ul style="list-style-type: none"> <li>• Answer depends on the previous answer being correct.</li> <li>• Answer depends on the previous response.</li> <li>• Answer depends on learner getting previous answer correct.</li> <li>• Mark allocation is inappropriate in response to the level of the question.</li> <li>• Answer depends on learner getting previous answer correct.</li> </ul>
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	6.6.2 Comment on the figure calculated in Question 6.6.1 above. (2)	
--	---	--

The main 'invalid' source of difficulty can be found in follow-on questions where the response to a question depends on getting the previous question correct. These were short 2-mark questions which are not likely to make a significant difference to learners' overall performance.

## 2.2 Other points regarding the quality of the examination

In table 6 below, examples of good questions/models are presented.

DBE 2014 P1	IEB 2014
Q2.4. (8 marks)	Q5.2 (10 marks)
	Q4.3.1. (4 marks)
	4.3.2. (4 marks)
	4.4. (20 marks)

## 2.3 Rating the quality of the examination papers

Table 7 presents the team's ratings of the quality of the examination papers.

Paper	Rating of examination paper
IEB	Satisfactory

While the team is of the view that the quality of the examination paper are improving from year to year, there are still several areas that need to be considered as detailed above. These are high-level national examination papers that necessarily demand a high level of rigor in their preparation.

## 3. Standard of the examinations

### 3.1 Levels of Difficulty

Table 8 below presents the levels of difficulty of the 2014 examination paper.

	<b>LEVELS OF DIFFICULTY</b>
--	-----------------------------

PAPER	L1	L2	L3	L4
IEB 2014	30%	33%	33%	4%

The team is of the view that the very difficult category is under-represented and should be between 10 and 15% of the total paper. This is important to distinguish the high achievers. The distribution of questions across the other three levels is fairly even.

### 3.2 Typical questions at different difficulty levels

Table 9 below presents examples of questions at the four difficulty levels:

Levels of difficulty	2014 IEB
Easy	5.1.1. What does the acronym PPI stand for? 2 marks
Moderate	5.5.2. Discuss how non-price competition influences the behaviour of Vodacom and its competitors.
Difficult	5.3.3. Analyse whether continuously decreasing prices would be good for the South African economy. 10 marks
Very Difficult	2.4. Discuss how the South African government can use monetary and fiscal policy to improve economic growth in South Africa. <b>Also evaluate how successful the government has been recently in achieving its goals of economic growth.</b> 20 marks.

### 3.3 Difficulty of stimulus/source material

Table 9: Number of stimulus/source material analysed as easy, moderately challenging and difficult.

Name of paper	Difficulty of stimulus material				Total
	Easy	Moderately difficult	Difficult	Very difficult	
IEB	3	7	2		12

The IEB paper had a total of 12 stimulus materials; 3 were considered easy, 7 moderately difficult and 2 as difficult.

In IEB Q4.3 the stimulus material (cartoon) does not connect strongly to the questions set.

#### **4. Recommendations for improving the quality and standard of the examinations**

4.1 Recommendations for improving the quality of the examinations:  
Invalid sources of difficulty were present in the paper (10 cases) The specific explanation for each of these was tabled in section 2 above.

4.2 Recommendations for improving the standard of the examination

4.2.1 The cognitive demand distribution of the paper reflects a heavy loading at cognitive levels 1 & 2 (over 50%) and a weak loading at levels 5 & 6 (under 10%). The testing of high level cognitive demand is clearly a neglected aspect in this paper, and as such does not provide a sufficient scope of questions that will distinguish high achieving students.

4.2.2 The distribution across the levels of difficulty indicates that just over half the questions in the examinations were classified as easy to moderately difficult (63%). While the distribution of questions across the levels of difficulty is fairly even for the first three categories of difficulty, questions in the 'very difficult' category are under-represented (4%).

The consequence of this is that the paper is not able to effectively distinguish high achieving learners. Examiners thus have to pay attention to this crucial aspect of the papers.

4.3 While the team feel that the quality and standard of the examination papers are improving marginally each year, the current paper is not a good model for future examinations for the reasons cited above.

#### **5. Comparability of examination papers**

Table 15: Comparability of overall quality of 2014 examinations relative to other exams

	Much worse	Worse than	Equivalent to	Better than	Much better
IEB 2012				x	
IEB 2013			X		

The team struggled to make this judgement as there were strong and weak aspects of all the papers. The view of the team was that the 2014 paper was comparable to the 2013 paper.

## 5.2 Comparability of standards

### Comparison of Cognitive Demand distribution across all papers under review

The table below provides comparative data for all papers.

Table 19: Comparison of cognitive demand across all examinations under review

PAPERS	LEVELS OF COGNITIVE DEMAND		
	CL1&CL2	CL3 & CL4	CL5 &CL6
IEB 2012	63%	13%	24%
IEB 2013	80%	13%	7%
IEB 2014	53%	38%	9%

The 2014 paper appears to be still loaded at cognitive levels 1&2 as compared to 2013 and 2012. It is still under-loaded at cognitive levels 5 and 6.

### Comparing levels of difficulty for each examination paper.

Table 16: Comparing levels of difficulty of all examination papers.

PAPER	LEVELS OF DIFFICULTY			
	L1	L2	L3	L4
IEB 2012	15%	50%	37%	8%
IEB 2013	14%	72%	14%	0%
<b>IEB 2014</b>	<b>30%</b>	<b>33%</b>	<b>33%</b>	<b>4%</b>

In terms of the distribution of questions across the levels of difficulty, the data indicates that the 2014 paper is under-loaded at difficulty level 4 and has a fairly even spread across the other three difficulty levels.

In comparison to previous year (2013), Difficulty level 4 has increased marginally by 4%, from 0% in 2013 to 4% in 2014. Difficulty level 3 has increased from 14% to 33%, a positive move in the opinion of the team. Questions at difficulty level 2 have dropped

from 72% to 33% in favour of questions at difficulty level 1. A total of 66% of this examination was classified as easy to moderately difficult.

In essence, the <30% learner is likely to perform better in the 2014 examination than their counterparts in the 2013 examination. The 80% candidates of 2014 are likely to experience this paper as more difficult than the 2014 papers since there is an increase in questions at difficulty levels 3 and 4.

## 2.4: Geography – Independent Examinations Board

### SUBJECT: GEOGRAPHY

#### 1. Compliance with the IEB subject assessment guidelines

##### 1.1 Format and structure

Table 1 below shows the format and structure of the papers of the three IEB geography examinations analysed in this report.

Name and number	Focus area	Duration	Total marks
IEB Paper 1 2012	Theory	3 hours	300
IEB Paper 2 2012	Map and photo work and GIS	1.5 hours	100
IEB Paper 1 2013	Theory	3 hours	300
IEB Paper 2 2013	Map and photo work and GIS	1.5 hours	100
IEB Paper 1 2013	Theory	3 hours	300
IEB Paper 2 2013	Map and photo work and GIS	1.5 hours	100

All papers complied with the specifications for their format and structure given in the IEB Subject Assessment Guidelines. The team considered the format and structure of the examination to be adequate.

##### 1.2 Cognitive demand weightings of the 2014 examination

The specifications of the cognitive demand weightings of the IEB geography papers and the actual weightings in the 2014 examination papers are given in Table 2.

	<b>Lower order</b> (knowledge, comprehension, application)	<b>Higher order</b> (analysis, synthesis, evaluation)
Specified for Paper 1	60%	40%
Specified for Paper 2	60%	40%
2014 Paper 1	64,6%	35.3%
2014 Paper 2	72%	28%

Table 2 shows that both the IEB papers are more heavily weighted in the lower order than is specified in the IEB SAG. This difference is only 5% in Paper 1, but is 12% in Paper 2. The overweighting of Paper 2 in this order is not altogether surprising as 60% of Paper 2 is required to be 'application of theory' (see Table 5), predisposing this paper to overweighting in the lower order where application is located.

Table 3 shows the weighting for the examination as a whole, with the weightings of both papers combined. It shows that for the examination as a whole, the IEB 2014 examination is more weighted in the lower order of cognitive demand and less in the higher order than is specified in the IEB Geography SAG.

	Lower order	Higher order
Specified	60%	40%
2014 papers combined	66.5%	33.75%

### 1.3 Topic or content and/or skills area weightings of the 2014 examination

Table 4 below shows the number of marks specified for different content areas in the IEB SAGS, as well as the actual number of marks allocated to these in Paper 1. From the table, it can be seen that the paper complies with the specifications for weightings of content topics.

Question Number	Topic	Specified no of marks	Actual number of marks
1	Geographical issues – all topics and skills	100	100
2	Climate, weather and geomorphology	100	100
3	Settlement and Economic Geography	100	100

Table 5 below shows the number of marks specified for different skills areas in the IEB SAGS, as well as the actual number of marks allocated to these in Paper 2. There are 2 marks more than specified for Basic mapwork skills, and 2 marks fewer than specified for Application of theory, but as these divergences are so slight, the paper can be said to comply with the SAGS in regard to the weightings of content and skills.

Skill	Specified no of marks	Actual no of marks
Basic mapwork skills	40	42
Application of theory	60	58

It is not possible to comment on the weightings of content and/ or skills for the two papers combined as the weighting for each is described using completely different constructs.

#### 1.4 Coverage of the examinable curriculum in all the IEB papers analysed

Each paper was broadly assessed with regard to coverage of the curriculum Content in the papers was compliant with the relevant curriculum (NCS/CAPS) and the IEB subject assessment guidelines pertaining to that curriculum.

In addition, as can be seen from Table 6, all papers covered at least 75% of the curriculum. In the 2014 paper, because of the fewer questions (see Section 1.5), the team felt that coverage was perhaps not as extensive as in previous years, with for example, no questions on GIS other than one on buffering and no questions on orthophotos. It was felt, however, that as long as content foci rotate from year to year this was not a real concern. This will be looked at carefully in 2015.

Name and number	Curriiculum Coverage rating		
Paper	100 %	75% - 100%	Less than 75%
IEB Paper 1 2012		x	
IEB Paper 2 2012		x	
IEB Paper 1 2013		x	

IEB Paper 2 2013		x	
IEB Paper 1 2014		x	
IEB Paper 2 2014		x	

### 1.5 Other points regarding compliance with assessment requirements

Both papers in all examinations complied with specifications regarding the numbers of questions to be set and answered. It should be noted that in 2014, Paper 1 no longer has 5 questions, of which candidates must all do Question 1 (an integrated question) and then choose one other from two set in Section A (Physical geography) and two in Section B (Human geography). Instead, in 2014, three questions were set (an integrated question, and one Human and one Physical geography question, and candidates had to answer all of them.

## 2. Quality of examination papers

### 1.1 Invalid sources of question difficulty or ease in all exam papers analysed

Each paper was analysed for invalid sources of difficulty/ease. The total number of questions in each paper and in the examination as a whole (Paper 1 and Paper 2 combined) deemed to provide an invalid source of difficulty or ease is provided in Table 7

Paper	Number of questions/paper	Total Marks per paper	No of questions for the papers combined	No of marks for the papers combined
IEB P1 2012	3	22		
IEB P2 2012	3	9		
IEB exam 2012			6	31
IEB P1 2013	5	28		
IEB P2 2013	2	4		
IEB exam 2013			7	32
IEB P1 2014	4	40		
IEB P2 2014	5	15		

IEB exam 2014			9	55
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Further details about questions deemed to have invalid sources of difficulty or ease are given in Table 8.

<i>Table 8. Details of questions assessed as having invalid sources of difficulty of ease and potential impact on candidates' marks</i>				
<b>Paper</b>	<b>Question No</b>	<b>Source of difficulty</b>	<b>Explanation</b>	<b>Potential impact on candidates' marks</b>
<b>IEB 2012</b>				
Paper 1	1.2.2d	Content & Expected response	Hard to draw a cut off low; plus memo gives a coastal low	Weak learners might earn marks, while stronger candidates lose them in trying to actually answer the question set.
	2.2.3	Expected Response	If answers to previous question are incorrectly identified then answer will be wrong in this question - and for 12 marks.	Marks likely to be lost
	3.2.7	Expected response	Question asks for a flow diagram - but memo gives a mindmap - as does structure of the template for learners to fill in.	Weak learners might earn marks, while stronger candidates lose them in trying to actually answer the question set.
Paper 2	2.1.1b	Stimulus	Poorly phrased question. Question should have asked: Give a possible reason for the rocky outcrop.	Marks likely to be lost
	2.1.2	Stimulus	No evidence on the map to facilitate required answer –	Marks likely to be lost
	4.3	Expected response	Unreliable memo and question does not direct the learners to what is really expected.	Marks likely to be lost
<b>IEB 2013</b>				
Paper 1	2.2.2	Stimulus	Question is dubious - no strong winds at PE - and memos says there is a steep pressure gradient - but is there is not - might be in future - but not here. The chart does not illustrate the situation that has to be analysed.	Weak learners might earn marks, while stronger candidates lose them in trying to actually answer the question set.
	2.3.3c	Stimulus	The photo does not give enough information for candidates to use to answer the questions.	Marks likely to be lost.

	2.4.3a	Stimulus	Very poorly labelled and structured table - makes info in it obscure.	Marks likely to be lost
	2.4.3c	Stimulus	Data incorrect; memo reasoning incorrect - seasons the wrong way round	Marks likely to be lost
	3.1.5	Task & Expected Response	Not actually drawing a flow diagram - just a mindmap - and difficult as candidates would not necessarily know what to do - as info not really suitable for a flow diagram. Memo info on causes is not really 'causes' - maybe causes of why hurricane was so strong? Info on causes not in fact files to which learners referred.	Marks likely to be lost unless memo adjusted
Paper 2	2.2.2	Task & Expected response	Memo does not require an explanation, question actually only expects a description.	Weak learners might earn marks, while stronger candidates lose them in trying to actually answer the question set.
	4.1.2a	Stimulus & Expected response	Question calls for assumption - not enough evidence for answer, hence any answer will be acceptable. May confuse learners who seek info from map.	Marks likely to be earned spuriously by weak learners while stronger learners feel they cannot answer and so lose marks.
<b>IEB 2014</b>				
Paper 1	1.1.3	Stimulus	Insufficient information is given for candidates to predict temperature in Central berg as required by memo.	Marks likely to be lost.
	1.4.1b	Stimulus	Can't see clearly what the feature is	Marks should be lost – but memo accepts such a range of possibilities that probably will not be – as long as candidate makes an attempt.
	2.7.2	Expected response	Unclear questions - needs to say what the contributing factors are related to. In addition, recommendations are required by question – but only 1 credited in memo. Candidates might well not focus their answers clearly enough on the factors given in terms of the way in which they contribute to flooding.	Candidates might lose marks by not analysing the factors listed in terms of how they contribute to flooding, and by spending time on recommendations for a management strategy when only 1 is required by memo

	3.7	Expected response	Do not really have to evaluate - task/memo mismatch; difficult in terms of task difficulty.	Candidates who try to evaluate might lose marks if they spend time trying to do this, but if candidates merely state information they will not lose marks as memo accepts this.
Paper 2	2.1.4	Stimulus	Term "stream flow" refers to turbulent and laminar not the Type of river indicated by dashed lines.	Learners likely not to answer correctly and so will be disadvantaged
	2.2	Expected response	Memo does not address what the question is asking as it only lists the characteristics of the underlying rock rather than suggesting how structure has influenced pattern developed	Marks likely to be earned by weak learners giving the answer to the usual question – which is the one answered in the memo - while stronger learners take time trying to answer the question set, or feel they cannot answer and so lose marks.
	3.1.3	Stimulus; expected response	Number of possible answer and memo answer is not really valid as the road is at a flood risk	Candidates might lose marks if memo discussion does not expand the acceptable answers.
	3.1.4.c	Expected response	Memo does not explain the methods, rather it states the purpose of the methods used by farmers	Candidates who actually try to answer the question might be disadvantaged
	4.3.2	Expected response	Question not specific with regards to where within block B4 the landing strip will be. Vague	Candidates might not know how to answer, and so might guess ( and perhaps collect some marks) or avoid the question (and so lose marks)

## 2.2 Other points regarding the quality of all the examinations

In addition to the concerns noted in Table 10 as they impacted unintentionally on the level of difficulty of some questions, there were other questions where the stimulus material was thought to be unnecessary or unhelpful, or where the language was not sharp enough, the memo deficient or inaccurate or there was some other technical issue.. More specific information related to these general points is provided in Table 9 below.

<b>Table 9. Examples of issues with format, structure or layout of the papers</b>	
<b>Paper</b>	<b>Question/figure number and issue</b>

IEB Paper 1 2012	Q1.2.3: Poorly phrased question. Q1.3.3: Memo actually requires an explanation rather than a prediction. Q2.3.2e Memo contains some strange answers – anabatic flow irrelevant Figure 14 contains unfamiliar technical terms that some learners might not have encountered before
IEB Paper 2 2012	Q2.4.3. Poorly structured and labelled table
IEB Paper 1 2013	Q1.4.2 Too much to read and some unfamiliar terminology that could be difficult for learners Q1.4.2 Too much to read and some unfamiliar terminology that could be difficult for learners Q2.2 Synoptic chart is not of a high quality – blurred Q2.2.2 Question relies on image, yet no evidence of strong winds in the image Q2.3.3c Photograph does not provide enough evidence to answer the question Q2.4.3, Table 2 – very poorly labelled and structured table; incorrect data in table Q4.4.1 Too much information to read in allocated time Q4.4.1.c Some possibly unfamiliar technical terms whose meaning some learners might not be able to access.
IEB Paper 2 2013	No concerns were recorded by the team
IEB Paper 1 2014	1.1.1b memo issue - could say TCs never/rarely cause - and also the memo has lost the frequently - looks easier than its
IEB Paper 2 2014	1.1.1a Memo states 4 strips and there are 5 (E4, D5, E5, D12, F8) 1.1.2b Memo shows an area - but Q asks them to write letter next to feature - if memo not adjusted children will lose marks. 1.1.5 Strangely worded -how can one justify a location - - need to give an opinion of suitability of site, and justify your view. Memo restricted - and on answer is debatable - i.e. why is west facing slope good/better than N or E or would have been. But still an easy Q. Learners likely to give 2 facts. 1.2.2. No real need for stimulus material 1.2.3 Memo gives a standard waterfall diagram - so in fact some element of ID as learners in Q have to do a more complex drawing if they have to show actual waterfall in picture - than in memo - memo accepts a standard WF drawing. 1.4.2 Cannot see the image clearly enough to know what its function is - but memo accommodates this so marks unlikely to be lost except for a candidate who does not answer. 1.4.4 No link between stimulus material and question. Memo is restricted – more possible answers than given here - in fact, the same answer given twice - increase employment opportunities. 2.2.4 Q should really have asked for probably/likely consequences - not just consequences as do not know what they actually were. 2.3.2 The map does not show the SE wind that is referred to, and if flow is geostrophic, the wind will not be a SE - and a cut -off low is not what is mainly associated with a Cape Doctor - but learners will get the answer as the Cape Doctor is only SE wind we name. 2.3.3b Note: the station model is unrealistic does not reflect the conditions at the yacht - low pressure gradient- yet model shows gale force winds.

	<p>2.4.3b Poorly phrased Q - it is actually asking them to explain why they chose the answer they did - should be explaining why the zone they chose has highest temp.</p> <p>2.4.4 Thin memo, and debatable; rather strange Q.</p> <p>2.6.1 Would help analysis if bullets had a, b, c, d so analysis can be allocated appropriately. Note - 2 marks are ID - cannot see levees.</p> <p>5.1 Question actually asking for map evidence about type of farming rather actually asking students to discuss. Mark allocation suggests that this is not really a discussion.</p>
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There were several questions which the team felt were good models for future examinations. These were largely those which required learners to draw or sketch. Some were scaffold for the learners in that a base drawing was provided which they had to embellish. The team felt that questions requiring drawing and sketching are good models for future questions as including them in the examination encourages teachers to help learners develop important and often neglected geographical skills and also tests understanding rather than straight recall.

### 2.3 Rating the quality of all the examination papers

Despite the issues noted in the previous three subsections of Section 2, all the papers are of good quality, as reflected in Table 10.

IEB P1 2012	Good
IEB P2 2012	Good
IEB P1 2013	Good
IEB P2 2013	Good
IEB P1 2014	Good
IEB P2 2014	Good

## 3. **Standard of the examination papers**

### 3.1 Levels of difficulty for all examination papers analysed

The team rated each sub-question in all papers as being either easy, moderately difficult, difficult or very difficult using guidelines provided by Umalusi. Table 11 shows the team's agreed weighting of marks for different

levels of difficulty for all the papers analysed<sup>1</sup>, and for each examination as a whole.

Table 11. <i>Percentage of marks awarded to the different levels of difficulty in the examination paper(s)</i>				
Paper	Percentage of marks in each category			
	Easy	Moderately difficult	Difficult	Very difficult
IEB 2012 Paper 1	44	36	20	0
IEB 2012 Paper 2	23	50	27	0
IEB 2012 P1 and P2 combined	40.5	38.33	21.17	0
IEB 2013 Paper 1	50.4	25.6	24	0
IEB 2013 Paper 2	53	21	26	0
IEB 2013 P1 and P2 combined	50.83	24.83	24.33	0
IEB 2014 Paper 1	53,6	30,3	16	0
IEB 2014 Paper 2	60	22	18	0
IEB 2014 P1 and P2 combined	55	28,25	16,5	0

Table 11 shows that in no papers were any questions considered to be 'very difficult'.

In each year, all papers are most weighted in the 'easy' category. The percentage of marks in this category has increased over the years, with the 2014 examination having the highest percentage of marks deemed easy (55%) and 2012 having the lowest(40,5%). The differences is most marked in Paper 2 , with the 2012 paper having only 23% of marks in the easy category, while in 2014 the percentage is 60%.

In all three years analysed, there is a greater percentage of marks in the middle than in the highest category of difficulty, though in 2013 the percentage of marks in the middle and highest categories is very close. The percentage of marks for questions deemed 'difficult' is noticeably lower in 2014 than it was in the previous years (17 % compared to 21%and 23% in 2012 and 2013 respectively)

The numbers of all invalid questions identified in paper(s) together with an explanation of the source of the invalid difficulty and its likely impact on

<sup>1</sup> There were no unresolved differences in ratings of difficulty levels among individual evaluators

candidates' marks has already been given in Table 7 in Section 2.1, and so this information is not listed again here. Similarly, comment was made on the weightings across levels of difficulty in Section 2.1 and is not repeated here.

In the 2012 and 2013 examination, there were 4 optional questions in Paper 1, and none in Paper 2. In 2014, neither paper had any optional questions. Table 12 below shows the weighting of marks across levels of difficulty for each of the optional questions in Paper 1 of 2012 and 2013.

<i>Table 12. Comparison of marks allocated to questions at each level of difficulty in the optional questions – as a percentage of marks for the question.</i>				
	Easy	Moderately difficult	Difficult	Very difficult
<b>IEB 2012 Paper 1</b>				
Question 2	56	44	0	0
Question 3	44	32	24	0
Question 4	42	28	30	0
Question 5	38	38	24	0
<b>IEB 2013 Paper 1</b>				
Question 2	44	34	22	0
Question 3	60	24	16	0
Question 4	58	22	20	0
Question 5	56	16	28	0

As shown in 14, Table In the two papers with optional questions, the spread of marks across the levels of difficulty is very different, suggesting that candidates' results might be impacted by the choice they make about which of the questions to answer. Details of these differences are provided below.

In the **IEB 2012** paper, question 2 is easier than the other questions, with over half the marks in the easy category, and none in the difficult category. Question four is the most difficult, with almost one third of the marks in the difficult category.

In the **IEB 2013** paper, question 3 is easier than the others, with 60% of the marks in the easy category, and 16% in the difficult category, and question two perhaps the most difficult with only 40% of the marks in the easy category.

This unequal weighting of marks across categories suggests that candidates making different choices might well be either penalised or advantaged by their

choice of easier or more difficult questions. At the same time, however, given that they were able to choose, it could be that those choosing more difficult questions did not deem them to be so, and managed as well as they might have on the questions deemed easier by the team.

The proportion of marks allocated at each level of difficulty in each paper and for each examination as a whole is shown in Table 11 earlier in this section of the report. The comments below regarding adequacy of the weighting of marks across levels of difficulty in the examination papers pertain to the data shown in this table.

If adequacy of weighting is to be discussed, then some idea of a notional ideal is needed against which to judge each paper's adequacy. Given that the pass mark is 30%, a weighting of 35% in the easy category could be considered adequate as it would give even weak candidates a chance of passing at this pass mark. About 40% in the moderately difficult category – would allow for candidates worthy of a C or a B to achieve this. This would allow for 20% of the paper to be for difficult questions, achievable by candidates worthy of a distinction, and a further 5% for the high-end achievers in the distinction category.

With this in mind, none of the individual papers or examinations as a whole has an adequate spread of marks across levels of difficulty.

None has any marks in the very difficult category.

**In 2012**, both Paper 1 and the examination as a whole have more than the ideal percentage of marks in the 'easy' category, though the percentage in this category is lower than in any of the other years. In Paper 2 the weighting of marks in the easy category is lower than the ideal. In this year, the weighting in the moderately difficult category is concomitantly too low for Paper 1 and too high for paper 2, and approaches the nominal ideal for the examination as a whole. In paper 1 and the examination as a whole, the percentage of marks in the difficult/very difficult categories is lower than the nominal ideal, while for Paper 2 is it slightly higher.

**In 2013**, both papers and the examination as a whole are more heavily weighted in the easy category than the nominal ideal. Concomitantly, all of these are underweighted in the moderately difficult category. However, when the easy and moderately difficult categories are considered together, both papers and the examination as a whole are close to the nominally ideal 75%

of the paper in these two categories. All have over 24% of the paper in the 'difficult' category, but no marks in the 'very difficult' category.

**In 2014**, both papers and the examination as a whole are more heavily weighted in the easy category than the nominal ideal. This is particularly so in paper 2, where 60% of the marks are allocated to 'easy' questions. Concomitantly, all of these are underweighted in the moderately difficult category, especially Paper 2. Despite this, however, when the easy and moderately difficult categories are considered together, both papers and the examination as a whole are still underweighted in regard to the nominally ideal 75% in these two categories. Neither paper nor the examination as a whole achieves even 20% of the marks in the difficult or very difficult categories.

### 3.2 Examples of questions at each level of difficulty

Table 15 below provides examples of easy, moderately difficult and difficult questions in the papers analysed. There is no example of a very difficult question as no questions were deemed to be very difficult.

Table 13. <i>Examples of questions at different levels of difficulty in the 2014 examination papers</i>		
Question No	Category	Question
Paper 1: Nov 2014		
1.1.1	Easy	State if the following statements are TRUE or LFALSE. If FALSE, write out the correct statement: a. mid-latitude cyclones can result in cold snaps and snow in the central Drakensberg.
2.3.1	Easy	Name the high pressure cells labelled A and B in figure 6
3.4.1	Easy	(With reference to a pie diagram): Give the percentage o the Western Cape provincial GDP that comes from ..a) manufacturing
2.6.1	Moderately difficult	Study photograph 10 on page (iii) of the colour insert: Draw a well labelled sketch of the river shown in Photograph 10. Label and identify the following features on your sketch in your answer book: <ul style="list-style-type: none"> <li>• the under-cut and slip-off slopes of a meander</li> <li>• a previous floodplain</li> <li>• levee</li> <li>• river terraces</li> </ul>
2.2.4	Moderately difficult	Write a paragraph in which you describe the consequences of a storm such as Usagi hitting

		southern Taiwan and a megacity such as Hong Kong (info about the storm provided in a fact file.
2.3.5	Difficult	Analyse the role the high pressure cells name in Question 2.3.1 played in bringing a period of heavy rain to the Western cape and the Karoo during the period 4 – 10 January 2014.
3.2.4	Difficult	Justify your opinion as to whether rural gated developments in South Africa contribute to social justice issues in rural areas
Paper 2: Nov 2014		
1.1.6	Easy	A number of physical features (A to D) have been labelled on the topographic map extract. identify each labelled feature by circling the correct <u>underlined</u> word(s) B. (Block C5) dry pan/reservoir/sewage works
1.2.3	Moderately difficult	Refer to the topographic map extract 2820CB AUGRABIES. Calculate the average gradient from spot height 844 (B10) to the reservoir in C9.
4.1	Difficult	Refer to the topographic map extract 2820 CB AUGRABIES. Focus on the blocked area. The Klipspringer Hiking trail has been inserted in the template below. Draw a land-use map of the area marked on the grid below by sketching in the following features: the course of the Orange river ( all fluvial features) Dirt (other) roads Spot heights and trigonometrical beacons/stations above 650 m The rest camp.

### 3.3 Difficulty of stimulus/source material

The Geography team did not evaluate the stimulus/source material separately with regard to level of difficulty of stimulus material. The difficulty of the stimulus material was considered as part of the assessment of the difficulty of the question – particularly with regard to the construct 'stimulus difficulty' and the nature of the stimulus material was also considered in analysing the cognitive demand of the papers.

### 3.4 Other points regarding the standard of the examination

The team had no additional point to make regarding the standard of the examination papers analysed.

## 4. **Recommendations for improving the quality and standard of the examinations**

4a. Recommendations for improving/enhancing the quality of the 2014 examination

The team felt that, overall, the quality and of the 2014 examination papers was good. However, some aspects could be considered in order to improve the quality further:

- Take even greater care to ensure that the action words used in the question are aligned to expected answers provided in the memo, and that the question is sharply focussed. Many of the instances of invalid sources of difficulty relate to this mismatch.
- In longer answers, award marks for the structure of the answer as well as for its content.

#### 4b. Recommendations for improving/enhancing the standard of the examinations

The team considered that the following recommendations could improve the utility and standard of the examinations

- The weighting of easy, moderately difficult questions could be adjusted so that fewer of the marks are allocated to 'easy questions, and more are allocated to 'moderately difficult' and 'difficult' and very difficult questions. The increased weighting of the latter, and the inclusion of some very difficult questions is needed to allow for the discrimination of very highly competent candidates.

The team felt that, despite some concerns expressed earlier in this report, the 2014 examinations are a good model for future examinations – particularly if the recommendations above are considered. Several aspects of the papers were considered worthy of note with regard to models for the future:

- Three compulsory questions for Paper 1, instead of the previous five questions with one compulsory and two out of the remaining four optional
- The integrated question in Paper 1
- The use of in situ glossing of possibly difficult words (such as for hinder in Question 1.3.2 of Paper 1)
- The need to correct incorrect statements in the true or false questions (such as in 1.1.1 of Paper 1)
- Questions that require candidates to draw field sketches from a map/photo and other kinds of drawing that is more than reproducing standard diagrams.
- Wonderful use of coloured images and photographs

## 5. Comparability of examination papers

### 5.1 Comparability of quality

The Umalusi instrument requires the quality of the papers to be analysed largely in terms of the numbers of questions with an invalid source of difficulty/ease, and also in terms of such factors as language level, format of questions, contextualization of questions and inaccuracy of marking memo. Table 14 below shows the team's assessment of the relative quality of the papers for the 2014 examination compared with those for the two years preceding it.

Table 14 Quality of the 2014 examination papers relative to examination papers for previous years.	
Paper	Rating of the corresponding 2014 Paper
2012 Paper 1	Equivalent
2013 Paper 1	Equivalent
2012 Paper 2	Equivalent
2013 Paper 2	Equivalent
2012 combined	Equivalent
2013 combined	Equivalent

The quality of the papers was seen to be similar and different in several ways. Weighing up of these led to the judgement reflected in Table 14.

Firstly, the rating for the quality of each paper was deemed by the team to be good (Table 10)

All the papers were clearly laid out, with diagrams and other stimulus material well numbered and clearly cross referenced to the text. The 2012 and 2013 papers had for more reading matter than the 2014 papers, and the team thought the 2014 examination was an improvement in this regard. The language level was generally appropriate, perhaps better in 2014 than in previous years in where some of the stimulus material contained unfamiliar terms which were not glossed. All the papers complied with the specifications for format and structure given in the IEB guidelines for the examination. All the papers provide learners the meanings of the key task word,s,

Table 7 shows that, while the 2014 examination Paper 1 had a very similar number of questions with an invalid source of difficulty to the previous years, it had more marks. This higher value for a similar number of questions was because of one 20 mark question which was deemed to have in invalid source of difficulty. Paper 2 of 2014 had 2 or 3 more questions with an invalid source of difficulty than had the papers of 2012 and 2013, and also more marks than either of the other papers. And the combined papers showed that the 2014 examination had 2 or 3 more questions with invalid sources of difficulty than the papers of 2012 and 2013, and 20 more marks because of the weighting of the one question in Paper 1

Table 9 shows that the team noted fewer 'other' 'technical' concerns with Paper 1 of 2014 than for that paper in the previous years. However, there were more of these of the 2014 Paper 2 than there had been in previous years.

Despite these quantitative differences, the papers of 2012 2013 and 2014 were considered by the team to be overall of equivalent quality.

## 5.2 Comparability of standards

In considering the overall performance trends of learners writing Geography in 2014, the team is of the opinion that candidates are likely to do better in the 2014 examination than in 2012 or 2013. This judgement is based largely, but not only, on the analysis of difficulty, shown in Table 11, Section 3.1. This suggests that:

- Weaker candidates will probably do better in 2014 than in either of the two previous years; the difference will be greater between 2014 and 2012 than between 2014 and 2013. This view is based on the higher weighting in the 'easy' category for both Paper 1 and Paper 2 in 2014 than in the previous years, most marked in regard to the 2012 paper. For the exam as a whole, the weighting in the easy category in 2014 is 55% - while in 2013 and 2012 it is 51% and 41 % (rounded up), respectively.
- The performance of candidates who might be expected to get a B or a C is likely to be slightly better, as, in 2014, over 80% of the paper is weighted at no more than moderately difficult, while in 2012 and 2011 it is 75% and 78 percent respectively.
- More candidates are likely to get an A in 2014 than in the previous years as only 16.55 of the 2014 paper is rated 'difficult' , while in 2013 and 2012 it is 24.33% and 21.17% respectively, and the difference is likely, therefore, to be most obvious when compared with 2012.
- The 2014 paper will be less able to distinguish the top candidates from others as fewer marks comparatively are awarded to 'difficult' questions – and like the other papers, none to 'very difficult'.

The team also believes that the change in the format of the 2014 Paper 1 should allow candidates to do better than in previous years. The fact that there are three questions instead of 5, and a concomitant reduction in reading load from this and the reduced stimulus material associated with fewer questions, will give candidates more time to answer each question, and they should do better.

A third factor is the change in the curriculum, with the CAPS specifying substantially less content for Grade 12, on which the examination is largely based, than did the NCS – allowing candidates to prepare themselves better for the examination.

## 2.5: History – Independent Examinations Board

### SUBJECT: HISTORY

Compliance with the CAPS and/or relevant assessment body.

#### 1.1 Format and structure

**Table 1: What was in NCS and what is in CAPS**

NCS examination structure	NCS	CAPS	CAPS examination structure
Paper 1: 200 marks			
<b>All questions compulsory, based on three topics which will be rotated on an annual basis.</b>	150	200	<b>The only change is the boosting of the marks to 200 from 150.</b>
<b>Section A</b> – In depth Individual Source Analysis made of three questions each worth 20 marks. The three sections being: <ol style="list-style-type: none"> <li>1. Visual Analysis</li> <li>2. Textual Analysis</li> <li>3. Media Analysis</li> </ol>	60	60	<b>Section A</b> – No change
<b>Section B</b> – Source-based questions – A single topic with a considerable number of sources presenting a range of different perspectives and reflecting different types of sources.	50	90	Section B – Marks increased to 90
<b>Section C</b> – Source-based essay - The sources used in Section B are used to construct a source-based essay.	40	50	<b>Section C</b> – Marks increased to 50
Paper 2: Extended writing paper - 100 marks			
<b>A choice of ONE out of two essays in Section A. No choice in Section B.</b>	150	100	<b>A choice of ONE out of three in Section A. A choice of ONE out of three in Section B. Marks reduced from 150 to 100.</b>
<b>Section A</b> – Discursive Essays – Candidates should choose ONE essay out of two set on different topics.	70	70	<b>Section A</b> – Only change is that candidates are now expected to choose ONE out of THREE themes.
<b>Section B</b> – Extended Writing – Candidates must answer both questions set on different sections for 40 marks each.	80	30	<b>Section B</b> – Extended Writing Candidates are only required to answer ONE of THREE themes set. The marks for this have been reduced to 30.

The format and structure requirements of all papers, including the 2014 final papers as laid down in the IEB's examination guidelines, have been adhered to.

## 1.2 Cognitive Demand Weighting

**Table 2: 2014 – Final Paper 1**

Levels	1	2	3	4	5	6	
Marks	40	54	2	40	0	64	
Team's %	20	27	1	20	0	32	
CAPS Specified %	(96) 48%			(104) 52%			

**Table 3: 2014 – Final Paper 2**

Levels	1	2	3	4	5	6	
Marks		90				210	
Team's %		30				70	
CAPS Specified %	30			70			

**Table 4: 2014 – Average cognitive demand for both papers**

	Level 1	Level 2	
	1, 2, 3	4, 5, 6	
Marks Paper 1	96	104	200
Marks Paper 2	30	70	100
<b>Marks Total</b>	<b>126</b>	<b>174</b>	<b>300</b>
Team's %	42	58	100

CAPS Specified %	60	40	100
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## General Discussion regarding Cognitive Demand categories

### 1.3 Topic or skill area weighting

Although the IEB uses a six-point scale for cognitive demand based on Bloom's taxonomy, these are broken up into lower and higher order cognitive demand categories. On this basis the 2014 papers yielded 42% of lower order skills and 58% of higher order. This would seem to be an inversion of the order specified in the assessment document which apportions 40% to lower order skills and 60% to higher order skills. Based on the team's analysis then, the IEB papers do not seem to be in harmony with that examining body's own requirements.

### 1.4 Rating for coverage of the examinable curriculum

**Table 5** – Content covered by the DBE NCS and CAPS papers

NCS /CAPS Topics	IEB NCS 2012/2013		IEB CAPS 2014 Papers	
	P1	P2	P1	P2
1. What was the impact of the Cold War in forming the world as it was in the 1960s? <b>How did the Cold War shape international relations after World War II?</b>	X		X	
2. How was uhuru realised in Africa in the 1960s and 1970s? <b>How did the Cold War influence independent Africa?</b>				O
3. What forms of civil society protests emerged from the 1960s up to the 1990s? <b>What was the nature of the</b>		X		O

<b>civil rights movements after World War II? USA</b>				
4. What was the impact of the collapse of the USSR in 1989? <b>What was the nature of the civil rights movements in South Africa after the 1960s?</b>	X			O
5. How did SA emerge as a democracy from the crises of the 1990s? <b>How did South Africa emerge as a democracy from the crises of the 1990s and come to terms with the apartheid past?</b>		X	X	
6. What do we understand by globalisation? <b>What was the significance of the events of 1989 and how has the world changed (globalisation)?</b>	X		X	

The topics in bold type are the revised CAPS topics. The “X” signifies that these topics were compulsory, while the “O” represents optional topics.

From this table it is clear that for the NCS papers the IEB set questions on five of the six topics in the curriculum, which amounts to an 83.33% coverage of the curriculum. Only topic 2 on Independent Africa was left out. The IEB now covers all topics in the curriculum, although it must be said that the coverage of Topic 6 (see Paper 1, Question 3) was somewhat tangential.

A notable change in the 2014 papers was the decision to greatly increase the number of optional questions in Paper 2. The candidate now needs to do only one essay out of the three offered and one piece of extended writing out of the three set. As a candidate could choose to do both the essay and the piece of extended writing on Independent Africa for example, the other two topics can be left out.

## 6. Quality of examination papers

### 2.1 Invalid sources of question difficulty or ease

In the opinion of the team, there were no invalid sources of question difficulty or ease in any of the four NCS IEB examination papers analysed. Questions were commendably easy to follow and in most cases there was no ambiguity in the answer expected.

The team was of the opinion, however, that Question 5 of 2014 Paper 2 was sufficiently problematic to be regarded as invalid. The argument behind this was that the extended writing seemed to hover uneasily between focussing on the involvement of the Civil Rights Movement in education and the more general aims and involvement of the movement. Whether it is simply a poorly framed question and is not really invalid was the subject of some debate. It would be answerable by candidates and as a result was treated as a moderate question when assessing difficulty levels, but it has been flagged as an invalid question in the tables.

The question is reproduced in full below:

## **THEME CIVIL SOCIETY PROTESTS 1950s TO 1970s**

### **QUESTION 5**

In 1957 nine black students went to register at Central High School in Little Rock, Arkansas. In the photograph below, 15-year old Elizabeth Eckford, one of the Little Rock Nine, tries to enter Central High School on 4 September 1957. She was denied entrance by the soldiers of the National Guard and was shouted at by angry crowds of parents and school students.



[Bettman/Corbis, (1957), *Elizabeth Eckford* [Online].

Available at: <<http://www.scholastic.com/browse/article.jsp?id=3756953>> Accessed 6 January 2014]

Explain the role played by the Civil Rights Movement to end racial discrimination in the USA in the 1950s by answering the following questions:

- (a) What was the Civil Rights Movement and what were its aims?
- (b) What did the Civil Rights Movement do in order to change the education system in the Southern States in the USA?
- (c) Explain how successful the Civil Rights Movement had been in achieving its aims by 1960.

**[30]**

## **2.2 Other points regarding the quality of examinations**

The papers will be handled together with references given to specific elements in the various papers.

**Language Level** – The team felt that the language level of the IEB papers was appropriate and easy to follow.

### **Sources**

The sources in the IEB papers were well-contextualised. Some examples of this are given below:

- In the case of a written source, the contextualisation of Source D in the 2013 Paper 1 Resource booklet reads as follows:

Simon Willis was born in England in 1946 to a British mother and an American father. He moved to the USA in 1950 and recalls his childhood in that country.

This biographical information is very illuminating and makes dealing with the source much easier than the frequently limited contextualisation of the DBE papers.

Similarly for Question 3 in 2014 Paper 1, instead of the bare web address and the date accessed that form the minimum requirement when accessing the Internet, this question is more fully contextualised thus:

The following article written by Albina Kovalyova, appeared on the NBC News website [www.worldnews.nbcnews.com](http://www.worldnews.nbcnews.com) on 28 November 2013.

An addition that may have proved useful would have been the inclusion of the detail that the NBC is a U.S. media organisation.

- Similarly for cartoons, contextualisation tends to assist the candidate in dealing with all the components of the visual image. For instance for Source E from the same booklet, the contextualisation of the cartoon reads as follows:

**A cartoon entitled *Who's next to be liberated from freedom?* by David Low, a British cartoonist, and published in March 1948. Stalin is seated while his Foreign Minister, Molotov, stands spinning the globe. On Stalin's desk is a photograph of the United States Secretary of State George Marshall**

It was pleasing to note the absence of textually dense and therefore opaque tertiary and secondary sources. Although Section B and C use a relatively large number of sources – eight in 2013 and 2014 – these sources are varied and short thereby not negatively affecting the candidates' ability to access them.

## Marking Memorandum

The team has no problems with any of the marking memoranda for the IEB papers.

### 2.3 Rating the quality of examination papers

The IEB papers analysed by the team were generally of a high quality and little purpose would be served by tabulating this. There is, however, a caveat to this finding with regard to the 2014 papers. The presence of an invalid or at least problematic question in Paper 2 and the inclusion of true or false questions in Paper 1 compromise to some extent the generally high regard in which the IEB papers have been held by the team over the years.

## 7. Standard of the examination papers

### 3.1 Levels of difficulty

**Table 6: Percentage of marks awarded to the different levels of difficulty in the examination paper(s) separately and combined.**

	Easy	Moderate	Difficult	V Difficult	Invalid
2012 P1	33.3	40	26.6		
2012 P2	53.3	46.6			
Combined	43.3	43.3	13.3		
2013 P1	26.6	40	33.3		

2013 P2	53.3	46.6			
Combined	39.95	43.3	16.65		
2014 P1	38	37	25		
2014 P2	0	76.6	23.3		(30)
Combined	19	56.8	24.2		
Easier option	0	100	0		
Harder	0	30	70		
Combined 1	25.3	58	16.7		
Combined 2	25.3	34.7	40		

The mark in brackets indicates that this total has not been used in the calculations in the table. It was felt that candidates would still be in a position to answer this question despite its being problematic.

A global discussion of this table is to be found after the discussion on invalid questions and optional questions.

### **Invalid Questions**

The invalid question in 2014 Paper 2 has already been discussed.

### **Optional Questions**

In the case of the IEB NCS papers, there was almost no choice. The only option given was in Paper 2 where candidates had to choose one out of two essays set. As the team were of the opinion that the level of difficulty of these two essays was similar – they were both regarded as moderate for candidates who had been properly taught – it would have made no difference to the overall difficulty level of the paper which essay the candidate chose to answer.

The situation has changed quite markedly with the 2014 Paper 2. As already mentioned, candidates choose one out of three essays and one out of three pieces of extended writing. The team evaluated all except the essay on Civil Society Protests (Question 2) as being of moderate difficulty. This essay was rated as difficult because of the large number of disparate movements that had to be discussed. One assumes, however, that a candidate choosing this more difficult option would have done so because he or she felt particularly confident of being able to master its particular complexity, so the impact may in fact be smaller than the analysis suggests.

Because of the large mark allocation for essays the effect of choosing the essay rated by the team as difficult is fairly considerable, being 25.3% easy questions, 34.7% moderate questions and 40% difficult questions compared with 25.3% easy questions, 58% moderate questions and 16.7% difficult questions for candidates opting for one of the two easier essays.

## Allocation of marks at the different levels

The 2012 and 2013 papers are very similar in their difficulty levels, with the 2013 paper having slightly more difficult questions and slightly fewer easy ones.

Because the IEB's 2014 Paper 1 now contributes 66.6% of the total marks for the paper, the optional question breakdown in Table 6 is much more accurate than simply averaging the percentages. On this basis the team felt that the changes in mark allocations appear to have increased the difficulty of the paper, although to a much less marked degree for those choosing one of the easier essays.

A major contributor to this increased difficulty was Paper 2, where none of the extended writing questions was adjudged easy. Furthermore these extended writing pieces now contribute only 30 marks out of 300 (10%) to the total, whereas in past papers they have contributed 80 marks out of 300 (26.7%) – a massive reduction in the impact of this type of question. In Paper 2 the decision to boost the source-based essay from 40 to 50 marks has also contributed to raising the difficulty level.

To compensate for the likely effect of these changes, the examiners have taken the rather controversial decision of introducing some exceptionally easy questions into the source-based exercise. Particularly problematic has been the decision to include 10 true or false questions vaguely centred on one of the sources. The team felt that this type of question was inappropriate for a matric examination and was particularly troubled by the decision to allocate two marks for each correct answer. It seemed to us that these questions and other similar ones tended to devalue the sources upon which they were supposedly set. A table dealing with killings during the 1990s could well have provided the examiner with the chance of setting some interesting questions, but his opportunity was missed and the source was used for the most basic extraction imaginable. The examiner, however, could well argue that all these sources would be properly used in the writing of the source-based essay.

### 3.2 Examples of questions at the various difficulty levels

Easy	Paper 1 6.1	How many political deaths were there in KwaZulu-Natal in 1993?
Moderate	Paper 1 2.3	Explain how revisionist historians would use this photograph to support their interpretation of the Vietnam War. Support your answer by using you knowledge as well as the photograph.
Difficult	Paper 1 C	<b>Use Sources A to H in the Source Booklet to write a source-based essay on the following topic:</b> <i>To what extent was the period 1990 to the end of 1993 in South Africa characterised more by acts of violence than by peaceful negotiations?</i>

		<b>Be sure to use the sources provided to construct your argument and remember to reference the sources by letter.</b>
V. difficult	None	

### 3.3 Difficulty of stimulus/source material

The sources for 2012, 2013 and 2014 have not differed to any significant extent. Therefore only 2014 papers will be analysed in the table.

Source Number	Rating	Comment where appropriate	
<b>Paper 1</b>	A1	2	
	A2		This is a photograph and the team felt that it was consequently difficult to rate, as it is the questions that would provide the source of difficulty, and not the photograph itself.
	A3	2	This is the source used for an exercise headed "Current Issue in the Media". It is a recent news article on Putin's rewriting of Russian history textbooks.
	BA	2	The language makes this source more difficult
	BB	2	Language difficulty. Although this is a secondary source, the author was closely involved as a UN consultant.
	BC	1	This is a very straightforward table on political deaths in KwaZulu-Natal and South Africa.
	BD		This is a photograph. (see above)
	BE	2	
	BF	1	This is a simple source on Amy Biehl which is barely used as the stimulus material for ten true or false questions.
	BG	2	
BH	2	Although this is a cartoon it should be fairly easy for candidates to interpret its message.	
<b>Paper 2</b>	Although a source of sorts is provided with each of the extended writing pieces, they do not form part of the answer expected from the candidates.		

The fact that the team found no difficult or very difficult sources should not be seen as a criticism of the paper. Sources **should** be accessible to the learners. It is what they do with them that is important.

## 8. Recommendations for improving the quality and standard of the examinations

Overall the IEB 2014 papers comprise a good model for future papers. The most problematic area as far as the team was concerned was the inclusion of a significant body of low level questions into the source-based question. We were particularly uncomfortable with the true or false questions, which in the opinion of the team are not appropriate for testing matric level students. In addition these questions tend to undermine the integrity of the sources as valid historical documents. A possible suggestion is the inclusion of a multiple choice section at the beginning of Paper 1. This could be used mainly for testing learners' knowledge of the sections of work covered by Paper 1. The new section could be worth 30 marks with the source-based question reduced to 60 marks. There would be two advantages to this move. Firstly, multiple choice question, while quick to answer, can be set in such a way that they elicit rather more thought than true or false questions. Secondly, questions which respect the sources can be set without having to artificially cram in low level knowledge questions.

## **9. Comparability of examination papers**

### **5.1 Comparability of quality**

The quality of the 2014 examination papers is slightly lower than both the 2012 and 2013 papers, the quality of which is equivalent. The reasons for this opinion have already been given, namely the invalid/problematic question in Paper 1 and the presence of too many low level questions in the source based question in Paper 1. Overall, however, the quality of all three years' papers is good and the issues raised in this report should be easy to address.

### **5.2 Comparability of difficulty**

Despite the presence of a large cache of low level questions in 2014 Paper 1, the team came to the conclusion that the overall difficulty level of the 2014 papers was higher than that of the preceding years, particularly of 2012, which the team rated the easiest of the three.

The increase in difficulty results from the boosting of the marks for the source-based essay and the considerable reduction of the proportion of marks assigned to the extended writing exercises, which, in addition, were adjudged by the team as all being of moderate difficulty.

## 2.6: Life Sciences – Independent Examinations Board

### SUBJECT: LIFE SCIENCES

#### 1. Compliance with the National Senior Certificate Handbook.

##### 1.1 Format and structure of examinations

Official document	Name	Paper	Sections	Total marks (H)
National Senior Certificate Handbook 2014	IEB 2014	1	PAPERS 1 & 2 FOLLOW THE SAME FORMAT Q1: Short questions answered on the paper Q2, Q3 & Q4: Longer type questions. Q5: Essay As for 2013	150 (2½)
		2		150 (2½)
		3	Includes a practical procedure following instructions and an experimental design	50 (1½)

#### Compliance of 2014 examinations with specified format and structure

Length, mark allocation and time is specified in the Subject Assessment Guidelines, and is adhered to. The format of the sections of examination papers is not specified in official documents, but the format given in Table 1.1 under the heading “Sections” has been followed for many years.

#### Comments

IEB examinations are very long (6,5 hours of examination time) in comparison with some other examining bodies. The format is repeated exactly in Papers 1 and 2. This format will change in 2015 to Paper 1 (3 h, 200 marks) and Paper 2 (2 h, 100 marks). Paper 3 will continue but is examined outside the examination period. Reduction in the duration of examination time is recommended in evaluations conducted by international examining bodies, as reported in the Report of the Ministerial Committee on the Standard of Senior Certificate examinations (2014).

##### 1.2 Cognitive demand weightings

**Table 1.2** Comparison of cognitive demand weightings specified and the percentage for the papers analysed

Year	Paper	Types of cognitive demand			
		Know	Understand	Apply	Analyse, Evaluate, Create
	<b>Specified</b>	60			40
2014	P1	31	25	16	28
	P2	34	22	17	27
	P3	6	20	40	34
	<b>Total</b>	<b>29</b>	<b>23</b>	<b>20</b>	<b>28</b>
	Specified	60			40

The specified weighting is given by “lower order” (knowledge, comprehension and application) and “higher order” (analysis, synthesis, and evaluation) cognitive demand.

The allocation of marks to cognitive types depends on the definitions of cognitive demand, which seems to differ between this analysis and the IEB examiners. Compliance with 60:40 split should not be emphasized, since the spread across the types of cognitive demand is more important.

Equal proportions of marks were allocated for “knowing” and higher order skills. Lower proportions of marks were allocated for “understanding” and “applying”. The examinations represent an **acceptable spread of questions across different cognitive skills, although higher order skills should be increased.**

### 1.3 Topic or content and/or skills area weightings

**Table 1.3** Comparison of the topic weightings (% of marks) specified with the weightings for the examination papers for 2014.

Year	Paper	Topics	Prescribed weighting	Actual weighting
2014	Paper 1	Diversity, change and continuity	40	37
		Tissues, cells and molecules	60	57
		Nature of Science	Not weighted	6
	Paper 2	Environmental Studies	40	47
		Life Processes	60	45
		Nature of Science	Not weighted	8
Paper 3	Nature of Science	100	100	

Comments

Papers 1 and 3 comply reasonably well with the prescribed weighting of topics. Paper 2 has higher than specified weighting of Environmental Studies, and underweighting of Life Processes. The weighting is not specified in the National Senior Certificate Handbook, but is specified in the Subject Assessment Guidelines. Paper 3 is entirely devoted to experimental procedures, which are classified here as Nature of Science. Papers 1 and 2 also contain questions about scientific procedures and skills that have their context in the relevant content, but do not test knowledge of that content. These questions are classified here as "Nature of Science", which does not receive a separate weighting in the prescribed weighting for Papers 1 and 2.

#### 1.4 Coverage of examinable curriculum

Year	Paper	Coverage
2012	1	All
	2	All
	3	Not weighted
2013	1	All
	2	All
	3	Not weighted
2014 Final	1	All
	2	All
	3	Not weighted

The examinable curriculum is fully covered in every examination paper. The Practical examination (Paper 3) includes an investigation that does not necessarily relate to prescribed content, but assesses eight skill areas that are prescribed in the SAG. The investigation is selected to be achievable within 1.5 h, and specifically not one of the activities prescribed in the curriculum.

#### 1.5 Other points regarding compliance with assessment requirements

Fleiss' Kappa was calculated for seven IEB examination papers on independently-conducted analyses of the examination papers. The values and percentage agreement for each paper are shown in Table 1.5. Details of the methods of calculating the inter-rater reliability are given in the DBE report.

	2012 P2	2013 P1	2013 P2	2013 P3	2014 P1	2014 P2	2014 P3
Fleiss kappa	0,46	0,35	0,32	0,38	0,28	0,51	0,32

% agreement	62,4	53,2	55,8	60,0	48,9	66,0	51,9
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Two papers (2012 P2 and 2014 P1) met the recommended criterion of 0,4 for fair to good inter-rater reliability, and two others (2013 P1 and 2013 P3) fell just below 0,4. The remaining three papers had poor agreement.

None of the percentage agreement values met the minimum criterion of 70%, although one (2014 P2) was close.

Low inter-rater reliability in a study of this nature has implications for achieving consensus among examiners, moderators and evaluators. In the present study, analysts discussed high-mark questions to achieve closer similarity in our analysis. We then calculated the mean score for each type of cognitive demand across all four team members. The mean was taken to be the consensus position for each paper.

## **2. Quality of examination papers**

### 2.1 Invalid sources of question difficulty or ease.

<i>Table 2.1: Number of questions assessed as having invalid sources of difficulty of ease</i>				
Year	Paper	Q No.	Marks	Reason for invalidity
2012	1	1.2.3	2	Relationship shown in graph is incorrect.
	Total		2	
	2	4.3.2	1	Two possibly correct answers
	Total		1	
2013	1	1.2.2	1	Two possibly correct answers
		1.5.2	1	Can't answer the question; memo incorrect
	Total		2	
	2	1.3C	2	Question poorly phrased; answer should be given per year.
		2.2	6	Question poorly worded. Data lacks scientific rigour.
		3.1.5C	1	Subjective decision of "some" vs "excellent"
		3.2.1	3	B and C are incorrect answers
		3.3.2	4	Invalid question.
		4.3.3	4	Estimating bird numbers may be confusing
		4.3.4	3	Too wordy; obvious answer not given
	Total		23	
	3	18	3	Answer is incorrect. Concentration of yeast cells is not related to growth

		1.1	3	Answer is incorrect
		1.2	2	Based on an incorrect assumption
	Total		8	
2014	1	1.4.3	2	Insufficient information provided to answer the question correctly
		3.1.3b	1	Confusing use of symbols
		3.2.1b	1	Memorandum did not allow for alternatives
	Total		4	
	2	1.3.4	2	None of the answers is correct
		2.1.4	1	Wording of question incorrect
		3.4	8	Stimulus in diagram is misleading; incorrect labelling of FSH
	Total		11	
	3	-	-	

### Comments

The analysts worked with draft memoranda for 2014, which will be adjusted considerably at the memo meetings before marking commences. Many questions identified here as ID in the 2014 papers will be corrected at that stage. All invalid sources of difficulty are likely to disadvantage the learner. However, the total number of marks designated invalid is low except for 2013 Paper 2.

IEB papers generally have very few invalid questions. The 2013 Paper 2 and Paper 3 are exceptions in this regard. The 2013 Paper 2 contained several very open-ended questions where almost any answer could be accepted, and several scientifically incorrect questions. Paper 3 was based on a scientifically flawed assumption that rate of aerobic respiration is an indicator of growth rate of a yeast colony. The method used did not measure the growth rate of a yeast colony, but the effect of different concentrations of yeast on the consumption of oxygen by a yeast colony.

Despite the flawed research design, learners could follow the instructions and complete most of the required tasks.

In 2014 Paper 2, Q 3.4, worth 8 marks was based on a misleading representation of the menstrual cycle.

Invalid questions in 2013 Paper 2 and 3 would have acted to the advantage of lower-performing candidates, since the questions were very open-ended. However, a high-performing candidate could be disadvantaged because of the difficulty of trying to ascertain what the question was actually asking. In 2014, there was a variety of reasons for invalid questions. Only one question (worth 8 marks) could adversely affect students who might spend too much time on it because of difficulty interpreting the diagram.

## 2.2 Other points regarding the quality of the examination

Many questions have long source material, contributing to the reading demand of the examination papers. Generally, the origin of the source material is given, but in some questions, the source material is not given. In 2014 Paper 1, some of the sources were inaccessible, and of dubious credibility. Fabricated datasets and experiments (2014 P2, Q1.3, and Source B in the essay; 2013 P2, Q2.2) are acknowledged as examiner's constructions, but lack scientific rigour and validity.

Diagrams are clear and of good quality. There were no problems with technical aspects. One minor error in Paper 2 of 2014 (Q4.2.3) was corrected by distributing an erratum prior to the examination. Language is generally accessible.

The essay questions are good examples of questions that meet all the requirements for higher order cognitive demand (candidates have to evaluate and select relevant source material and construct an argument), but low level of difficulty. The essay topic was:

"Do you think the South African natural environment will survive the human population increase in this country?"

This question does not require in-depth disciplinary knowledge of an abstract nature, nor the use of scientific terminology. IEB examiners report that the argumentative essay no longer discriminates among the more capable students.

## 2.3 Rating the quality of examination papers

2012	Paper 1	Good
	Paper 2	Good
	Paper 3	Good
2013	Paper 1	Good
	Paper 2	Fair
	Paper 3	Fair
2014	Paper 1	Good
	Paper 2	Good
	Paper 3	Good

### **3. Standard of the examination papers**

#### 3.1 Levels of difficulty

<b>Table 3.1 Percentage of marks awarded to the different levels of difficulty in the examination papers</b>						
<b>Year</b>	<b>Paper</b>	<b>Levels of difficulty</b>				
		1	2	3	4	ID
2012	P1	27,3	39,0	31,7	2,0	0,0
	P2	31,2	35,2	30,8	2,3	0,5
	P3	14,0	36,0	26,0	24,0	0,0
	Total	27,1	36,9	30,5	5,3	0,2
2013	P1	17,2	43,0	36,7	2,8	0,3
	P2	40,7	27,7	15,8	0,5	15,3
	P3	7,5	37,0	27,5	16,0	12,0
	Total	25,9	35,6	26,4	3,7	8,4
2014	P1	29,5	33,7	33,8	1,8	1,2
	P2	36,0	28,7	25,7	1,8	7,8
	P3	14,0	36,0	31,0	16,0	3,0
	Total	30,0	32,0	29,9	3,9	4,2

Considering the proportion of marks for Level 1 difficulty only, Paper 2 was consistently easier than Paper 1, but particularly so in 2013. Considering the proportion of marks for Level 4 difficulty, Paper 3 was consistently rated as more difficult than Papers 1 and 2. Overall, a small proportion of marks were rated as being of Level 4 difficulty.

With regard to questions rated as having invalid difficulty, 2013 Paper 2 stood out as having an unusually high proportion of questions that were rated invalid (15,3% of the marks). There was also an unusually high proportion of marks rated invalid in 2013 Paper 3, because the investigation lacked scientific validity.

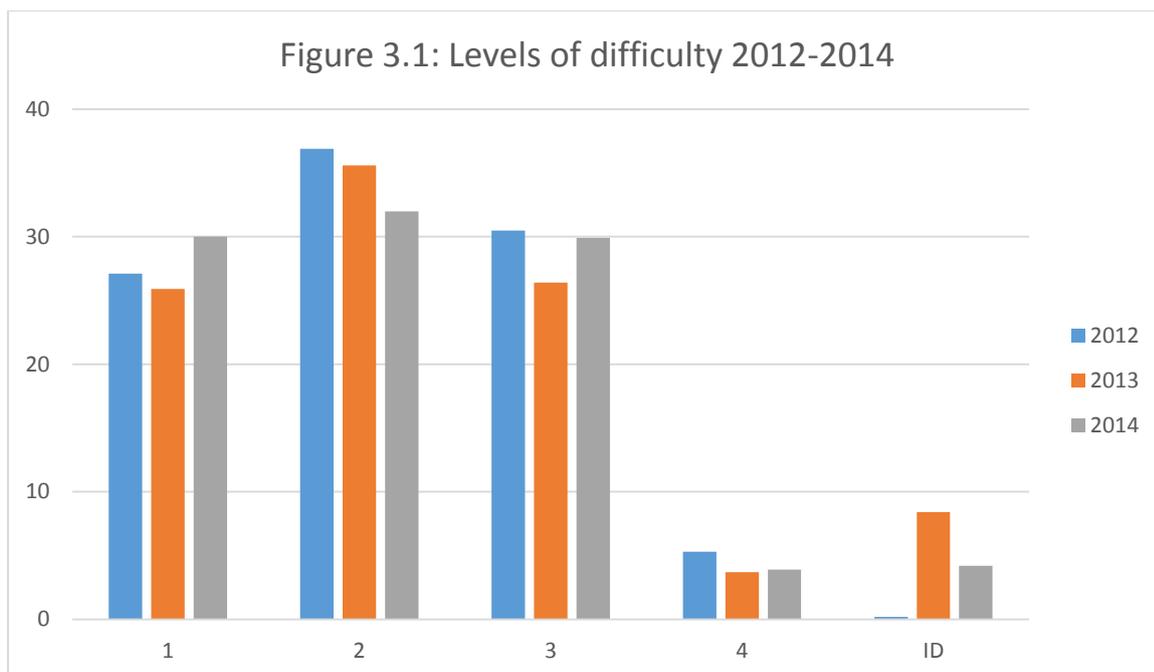


Figure 3.1 shows the levels of difficulty in the whole examination for each year being studied. It shows clearly that 2014 has more level 1 questions than any other year, and fewer level 2 questions. The proportion of marks allocated Level 3 difficulty in 2014 is consistent with 2012, but higher than 2013. It appears that 2013 was an anomalous year with poor quality Papers 2 and 3.

All examination papers have sufficient marks available at Level 1, but insufficient to differentiate the top-performers through questions that have Level 4 difficulty.

### 3.2 Examples of questions at each level of difficulty

#### **Level 1 question**

2014 P1 Q1.1

Select the term in Column B which best matches the description in Column A (Definitions of 9 terms in Column A against 111 terms in Column B).

2014 P2 Q1.3.7

State one advantage of sexual reproduction in peaches.

#### **Level 2 Question**

2014 P1 Q2.4.2b)

State two properties of mt-DNA that make it useful in forensics.

2014 P2 Q3,3

Various physical and physiological (functional) changes occur during puberty. Identify and describe TWO physiological changes that occur during puberty in females.

### **Level 3 question**

2014 P2 Q5

Do you think the South African natural environment will survive the human population increase in this country?

2014 P1 Q5

Is there any benefit in scientists working together to find out more about the evolution of modern humans (*Homo sapiens*)?

### **Level 4 question**

2014 P1Q1.5.1

Place an X on the graph line – curve where you would expect the bottleneck event to have occurred.

2014 P2 Q 4.2.3

Redraw the outline of the graph below and complete the survivorship curve using the information in the passage above.

### **3.3 Difficulty of stimulus/source material**

IEB examination papers provide a large amount of resource material, which adds to the reading load of the examinations. The essay question requires candidates to engage with several sources of information, and to make selections of relevant sources to support an argument. The sources are relatively brief and generally deal with an issue rather than disciplinary knowledge. Although the sources appear to be excessively demanding in terms of reading requirements, candidates are reported to cope well with the tasks. However, when viewed by team members familiar with the DBE context, the source material appears excessive. Likewise, to team members familiar with the DBE context, Paper 3 (the Practical paper) appeared extremely difficult.

In the 2014 examination papers, some of the resource material did not pertain to the topic of the essay. For example, in the 2014 Final Paper 1, the essay topic was:

“Is there any benefit in scientists working together to find out more about the evolution of modern humans?”

Eight items of source material were provided, most related to human evolution, but containing very little to contribute to the argument about the benefits of collaborative scientific work rather than solitary investigations. The memorandum included points that were not related to the focus of the essay, which was collaboration versus solitary research in palaeoanthropology.

Essay topics in previous IEB papers have been well structured, with a relevant selection of source material. The 2014 essay topics were disappointing.

### 3.4 Other points regarding the standard of the examination

Inter-rater reliability was difficult to achieve in this analysis, since each rater is influenced by their own context and experience. Our team included one academic, one IEB experienced Life Sciences teacher, one DBE experienced Life Sciences teacher, and one Life Sciences subject advisor from DBE. Three provinces were represented on the team: Western Cape, Gauteng and KwaZulu-Natal. The presence of an IEB teacher was extremely helpful in making judgements about IEB papers.

After the training session, analysts worked independently on the analysis of examination papers. This was followed by a meeting to discuss questions where consensus had not been achieved, which was the case with almost all questions. Fleiss kappa and percentage agreement were calculated using the raw data for certain papers, before we discussed our analyses. The results are shown in Table 3.4.

	2012 P2	2013 P1	2013 P2	2013 P3	2014 P1	2014 P2	2014 P3
Fleiss kappa	0,20	0,22	0,34	0,24	0,19	0,24	0,23
% agreement	48,3	50,8	65,7	50,8	44,9	51,6	45,4

All the Kappa values fall into the category of “poor agreement beyond chance”, as proposed by Fleiss et al. (2003). The percentage agreement values also fell below the 70% regarded as acceptable for social science studies in the communication field (Neuendorf, 2002).

The implication of this analysis is that the judgement of level of difficulty is very subjective, and varies considerably depending on the experience of the rater. Inter-rater reliability is consistently worse for levels of difficulty than for cognitive demand (See Table 1.5). Nevertheless, team members felt more confident about allocating a level of difficulty than assigning a question to a type of cognitive demand. They reported that they responded intuitively, without reference to a set of criteria. In other words, it was a “guess”. An improvement would be provision of a set of criteria for levels of difficulty.

For this analysis, the team discussed their rating of high-mark questions to see if consensus could be achieved on those questions. We then discussed questions rated as invalid. Team members reported that they found it difficult to identify invalid difficulty. Once we had achieved closer consensus in the total number of marks allocated to each level of difficulty, we took the mean for all four raters. The means after team discussion and adjustment of ratings are the values shown in Table 3.1.

#### **4. Recommendations for improving the quality and standard of the examinations**

##### a) Quality of examinations.

The team agrees that the quality of the papers are acceptable as they exist. We welcome the changes that are about to be implemented in 2015. The layout is clear, diagrams are clear, and all questions have the correct marks attached. Sources are given for diagrams and text, although see our previous concern about the credibility of some sources, and inability to locate material. We recommend that diagrams and tables are numbered and given titles in accordance with scientific convention. This will avoid the necessity to refer to “the diagram above” or “the table below”. Fabricated datasets should be avoided or should at least be plausible, unlike 2013 P2, Q 2.2.

##### b) Standard of examination papers

The team expresses concern about the lack of depth in content questions, reflected in the small proportion of marks at Level 4. We have noted a decline in the challenge of the examination papers between 2012 and 2014. There are fewer questions requiring in-depth interrogation of information that enables the top performers to be discriminated from the average. There are too many open-ended

questions requiring general knowledge rather than disciplinary knowledge. The essay question, which promotes the skill of argumentation, is based on general knowledge rather than specialist subject knowledge. We recommend that this change in future.

The proposed changes to the structure of the examination to be implemented from 2015, are welcome.

## **5. Comparability of examination papers**

### 5.1 Comparability of quality

*Table 5.1 Quality of the 2014 examination papers relative to examination papers for previous years.*

	2013 Paper 1	2013 Paper 2	2013 Paper 3	2012 Paper 1	2012 Paper 2	2012 Paper 3
2014 Paper 1	Equivalent to			Worse than		
2014 Paper 2		Better than			Worse than	
2014 Paper 3			Much better than			Equivalent to

Errors in 2013 Paper 2 and 3 and both papers for 2014 detracted from the quality of those papers. The best quality papers analysed were 2012 Papers 1 and 2, with very few questions identified as invalid. Please refer to Point 4 a) for a discussion of the quality of 2014 examinations relative to previous years.

### 5.2 Comparability of standards

Performance of learners in 2014 will improve compared with 2012 and 2013, because there is a higher proportion of difficulty level 1 questions and a lower proportion of Level 4 questions. There is very little scope for discriminating high-performing candidates. We therefore predict a high pass rate at 30%, and a high proportion of students achieving A symbols.

## 2.7: Mathematics – Independent Examinations Board

### SUBJECT: MATHEMATICS

#### 1. Compliance with the CAPS and IEB examination guidelines

##### 1.1 Format and structure

The following examination papers were analysed. The key content differences between the 2012-2013 papers and the 2014 papers have been highlighted. It is important to note these differences as the inclusion of probability in paper 1 of 2014 and Euclidean geometry in paper 2 of 2014 might have an impact on the results of the examination. Both these topics are generally considered to be demanding and there has been concern that some teachers might not feel confident teaching these topics.

<b>Basics format and structure of papers analysed</b>				
Year	Papers	Topics	Time	Marks
2012 - 2013	Paper 1	Algebra, Sequences, Financial mathematics, Functions, Calculus, Linear programming	3 hrs	150
	Paper 2	Statistics, Analytical geometry, Trigonometry, Transformation geometry	3 hrs	150
2014	Exemplar P1 and Nov Paper 1	Algebra, Sequences, Financial mathematics, Functions, Calculus, Probability	3 hrs	150
	Exemplar P2 and Nov Paper 2	Statistics, Analytical geometry, Trigonometry, Euclidean geometry	3 hrs	150

The 2014 papers complied with the basic format and structure stipulated in the CAPS.

##### 1.2 Topic weightings of the 2014 papers

The table below shows the weighting of topics as stipulated in the IEB examination guidelines (January 2013) and the weighting found in the 2014 examination papers.

	<b>IEB examination guidelines stipulation</b>	<b>2014 Paper 1</b>		<b>IEB examination guidelines stipulation</b>	<b>2014 Paper 2</b>
Algebra	8%	9%	Coordinate geometry	13%	14%

Sequences	8%	8%	Trigonometry	13%	16%
Financial mathematics	5%	6%	Statistics	7%	7%
Functions	12%	11%	Euclidean geometry	17%	13%
Calculus	12%	12%	Bookwork <sup>2</sup>	2%	0%
Probability	5%	5%			

The figures indicated in the table show that the 2014 papers comply with the stipulations in the IEB examination guidelines apart from in trigonometry and Euclidean geometry. Trigonometry was more heavily weighted than stipulated in the guidelines and Euclidean geometry less heavily weighted. However question 5d (worth 2% in total) contained elements of both trigonometry and measurement (which could fall in Euclidean geometry), but we classified it as trigonometry. This might account for the differences seen. The team thus felt that examinations papers complied sufficiently with the IEB examination guidelines.

A point worth noting from the table is that the new topics in 2014 (probability and Euclidean geometry) account for 18% of the combined total of paper 1 and paper 2. This significant change in content from the 2012 and 2013 papers to the 2014 papers makes comparison of the levels of difficulty of the 2014 papers with those of previous years challenging.

### 1.3 Cognitive demand weighting in 2014 papers

The IEB examination guidelines stipulates a spread of cognitive demand according to a taxonomy which has 4 levels: knowledge, routine procedures, complex procedures and problem solving. The weighting stipulated in the guidelines is shown in the table below along with a summary of the team's analysis of the 2014 papers in relation to cognitive demand.

	<b>Knowledge</b>	<b>Routine Procedures</b>	<b>Complex Procedures</b>	<b>Problem Solving</b>
IEB examination guidelines	20%	30%	35%	15%
2014 Paper 1	4%	65%	27%	3%
2014 Paper 2	15%	46%	29%	10%
2014 Papers 1 & 2 combined	10%	56%	28%	7%

The table suggests that the 2014 papers did not comply with the weighting of cognitive demand as stipulated in CAPS. The team's analysis suggested that the papers were too heavily weighted towards routine procedures and did not

<sup>2</sup> As bookwork will relate to particular topics the marks for bookwork will also be included in the marks for the topics where it appears.

contain sufficient weighting for problem solving. However the team felt that the problem might be a result of inadequacies in the taxonomy itself rather than a result of problems with the examination per se.

The CAPS document of 2011 provides descriptions of the levels of cognitive demand. However the description of each of the levels in both these documents is not entirely clear. For example, it is not clear how “complex procedures” differ from “problem solving” as the descriptors for both allude to higher order reasoning, solving problems and having no obvious route to the solution. The team queried whether it would be possible, in a time-limited examination to include 15% worth of true problem solving questions (i.e. questions where there is no clear starting point or clues as to the approach to take). It is also not clear whether a well-known procedure that contains many steps or tricky algebraic manipulation should be classified as a routine or complex procedure. This makes the taxonomy very difficult to work with, and, means that differences between the team’s analysis of the papers and the stipulated weighting in CAPS might be a result of different interpretations of the categories.

#### **1.4 Coverage of examinable curriculum**

All the examination papers analysed covered the examinable curriculum. Clearly no examination paper can examine every detail of the curriculum. So for example, the IEB 2014 paper 2 does not examine the graph of the tan function in trigonometry. However the graphs of the sin and cos functions are examined here and the tan function is used in other trigonometry questions. Thus although no single examination paper examines every detail of the curriculum, all the examination papers provide full coverage of the examinable curriculum at a broader level (e.g. trigonometric graphs are examined even if it is not possible to examine EVERY trigonometric graph mentioned in the curriculum).

## **2. Quality of examination papers**

### **2.1 Invalid sources of question difficulty or ease**

Only one question in the IEB mathematics papers from 2012 – 2014 were judged as having an invalid source of difficulty. This was question 6b2 (worth 5 marks) of paper 2 of 2012. Here a mistake in the question meant that tangent line shown could not have been common to both circles and thus learners who approached the question in a particular way would not have been able to make progress.

The fact that point Q(-3; 2) appears to be on the same horizontal line as M and O in question 6 of paper 2 of 2014 is misleading. However learners are told that diagrams are not drawn to scale and thus should not make assumptions from the appearance of a diagram. For this reason we did not indicate this as an

invalid source of difficulty, however clearly it is not desirable for diagrams to be misleading.

## 2.2 Other points regarding the quality of the examination

The diagrams and graphs in the examination papers were generally clear and appropriate. However in paper 2 there were some aspects where the quality of the layout could be improved. It is generally conventional for variables to be written in italics. This was done in paper 1, however in paper 2 for the most part this was not done except in one place. It would be better to be consistent. The graph in question 3 of paper 2 could have been of better quality. The thick line used made it appear inaccurate in parts (e.g. point D appears to sit more than half-way between 200 and 400).

The memos were of a good standard and provide clear mark allocations.

The team felt that overall the language used in the examination papers was generally clear and at an appropriate level. However we acknowledge that questions, particularly in the financial mathematics section and in applications of calculus and in probability and statistics, do require a good proficiency in English and an ability to interpret mathematical ideas in context. Paper 1 question 8 contained language that was confusing in that "largest volume" is given a different meaning to "maximum volume".

## 2.3 Rating the quality of the examination papers

The team rate the quality (in terms of layout and format) of the IEB papers from 2012 – 2014 as good although the layout and typesetting of the 2014 paper 2 could have been improved.

# 3. Standard of the examination papers

## 3.1 Levels of difficulty

The team judged the level of difficulty of questions based on the assumption that learners writing the examination would have been taught the full curriculum in an adequate manner. The team considered whether a question would be easy, moderate, difficult or very difficult for the average learner to answer. In order to help ourselves make clear and consistent judgments we further refined this as follows: Easy questions would be those questions that the learner who just passes should be able to do. Moderate questions would be more challenging than this but still be accessible to the student aiming for a "solid pass" and should indicate a mastery of the routine procedures in mathematics. Difficult questions are challenging questions that would be aimed at those wanting to demonstrate a good grasp of mathematics. Very difficult are aimed at the top students. With these judgments in mind the teams proposed ideal split of weights were as follows:

Team's proposed ideal weighting	Easy	Moderate	Difficult	Very difficult
	30%	30%-35%	20%-25%	15%

<b>IEB Paper 1</b>	Easy	Moderate	Difficult	Very difficult	Invalid
2012	15%	42%	39%	4%	
2013	18%	36%	39%	7%	
2014	23%	51%	23%	3%	

<b>IEB Paper 2</b>	Easy	Moderate	Difficult	Very difficult	Invalid
2012	7%	58%	24%	7%	3%
2013	23%	42%	19%	15%	
2014	31%	36%	23%	10%	

<b>IEB Paper 1&amp;2</b>	Easy	Moderate	Difficult	Very difficult	Invalid
2012	11%	50%	32%	6%	2%
2013	21%	39%	29%	11%	
2014	27%	43%	23%	7%	

Comparing the spread of marks in relation to level of difficult in the combined paper 1 and 2, we see that the 2012 and 2013 papers do provide the 60/65%-40/35% split between the easy-moderate and difficult-very difficult questions that the team considered desirable. However in 2012 and 2013 there were too few very difficult questions and too few easy questions.

There was marked variability in the weightings of level of difficulty between paper1 and paper 2 in the 2014 papers. Paper 2 of 2014 had a spread of levels of difficulty that was very close to the ideal weighting proposed by the team. However paper 1 of 2014 was too heavily weighted with moderate questions and this meant that the combination of paper 1 and paper 2 ended up being too heavily weighted with moderate questions.

In addition the 2014 examination papers differed from the rest in that the weighting of levels of difficulty as judged by the team suggested the paper, (with 70% of the marks at the easy-moderate level) was too easy. This was mainly as a result of paper 1. However it is very important to note that the team judged the level of difficulty of questions based on the assumption that learners writing the examination would have been taught the full curriculum in an adequate manner. However, the team notes that in 2014 Euclidean geometry and probability are being introduced into the examinations for the first time<sup>3</sup>.

Because the Euclidean geometry in particular has been an area of concern, we extract the information about the levels of difficultiy of the questions on the 2014 paper relating to Euclidean geometry and show them in the table below:

<b>2014 Euclidean geometry</b>	<b>Easy</b>	<b>Moderate</b>	<b>Difficult</b>	<b>Very difficult</b>

<sup>3</sup> Although these topics were examined prior to 2014 in paper 3, in the IEB examinations xxx% of learners wrote paper 3.

% of Euclidean geometry questions	48%	30%	13%	10%
% of marks on paper 2	13%	8%	3%	3%
% of total marks on paper 1&2	6%	4%	2%	1%

The majority of questions in the Euclidean geometry section involved either identifying the reason why given facts were true or direct application of known facts. This meant that almost 80% of the Euclidean geometry questions were judged to be easy or moderate by the team. This, however, presupposes that Euclidean geometry has been taught adequately at all schools and that learners have had sufficient exposure to geometry in order to provide them with the confidence and ability to "see" geometrically. Although this should be the case in good schools, it is likely that in schools where teachers do not have experience in teaching geometry this is unlikely to have happened. Although it is very difficult to guess how the geometry questions will be experienced by learners who have not had adequate preparation in geometry, the team considered the following scenario as a possibility:

10% of the marks on paper 1&2 combined consisted of easy or moderate Euclidean geometry questions. If half of these were actually experienced by learners who have not had adequate preparation in geometry as difficult or very difficult the spread of levels of difficulty for paper 1&2 combined could look like this:

<b>2014 corrected for poor geometry teaching</b>	Easy	Moderate	Difficult	Very difficult
IEB paper 2	25%	32%	29%	14%
IEB paper 1&2	24%	41%	26%	9%

In this scenario we see the 2014 papers follow a similar pattern to those of previous years. Here the weighting of levels of difficulty is broadly appropriate except for the fact that there are too few very difficult questions.

### **3.2 Examples of questions at different level of difficulty from the 2014 papers.**

#### **Examples of easy questions**

$$x^2 - 5x = -6$$

$$(3x+1)(x-4) < 0$$

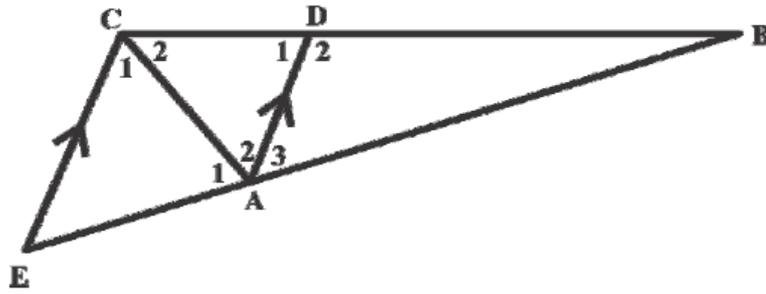
Both the above questions would be very familiar questions and are both straight forward procedures to perform.

$$P(2;8) , Q(4;y) \text{ and } R(x;0).$$

**Determine x and y if Q is the midpoint of PR.**

The above questions requires learners substitute into a known formula and solve for x and y.

- (a) In the diagram below, triangle BEC is drawn. D and A are points on BC and BE respectively so that  $AD \parallel EC$  and DA bisects  $\hat{CAB}$ .



- (1) Complete the reasons for each of the given statements.

STATEMENT	REASON
$\hat{A}_2 = \hat{A}_3$	
$\hat{A}_2 = \hat{C}_1$	
$\hat{E} = \hat{A}_3$	

(3)

- (2) If the statements in (1) are true, what can be deduced about  $\triangle CEA$ ? Explain.

The above questions is a straightforward application of known facts.

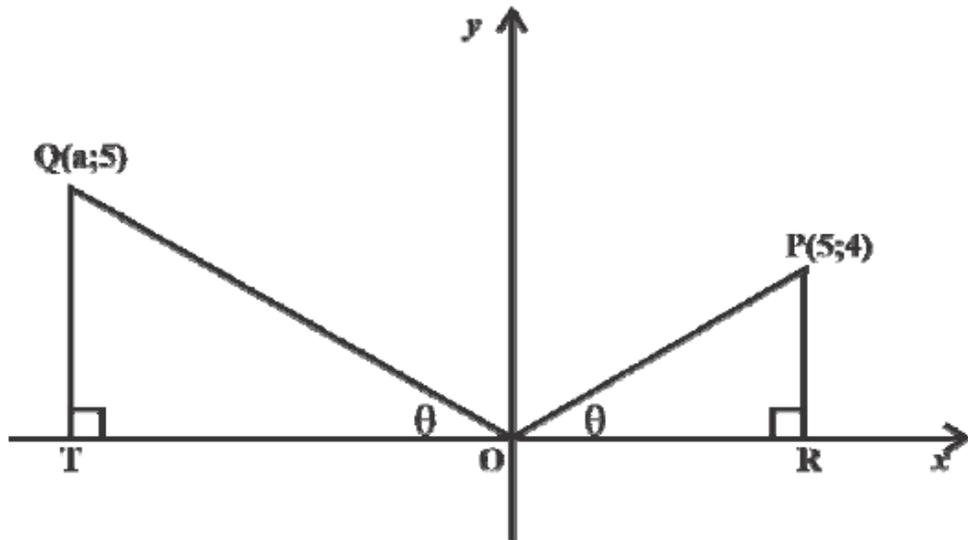
### Examples of moderate questions

Questions in this category tended to involve procedures that would be familiar to learners that are fairly straightforward to perform.

Solve for  $x$  and  $y$ :

$$2x - y = 8 \text{ and } x^2 - xy + y^2 = 19$$

In the diagram below, similar triangles  $\triangle OPR$  and  $\triangle OQT$  are drawn.  
 O is the origin.  
 R and T are points on the x-axis.



Determine, leaving answers in surd form if necessary:

(1)  $\cos(90^\circ + \theta)$ .

**Examples of difficult questions**

Given:  $f(x) = ax^3 + bx^2 + cx$

$f'(-1,5) = f'(5) = 0$  with  $f(x)$  increasing for  $-1,5 < x < 5$ .

(1) Use this information to draw a rough sketch of  $y = f(x)$ .

(2) Find the values of  $x$  for which:

(i)  $f'(x) < 0$ .

(ii)  $f$  is concave upwards.

The above question relies on being able to put together different pieces of information and understanding what the derivative means.

Prove the identity  $\frac{2 \tan \theta}{1 + \tan^2 \theta} = \sin 2\theta$ .

This trigonometry questions would not be routine for learners and they would need to think about how to approach it.

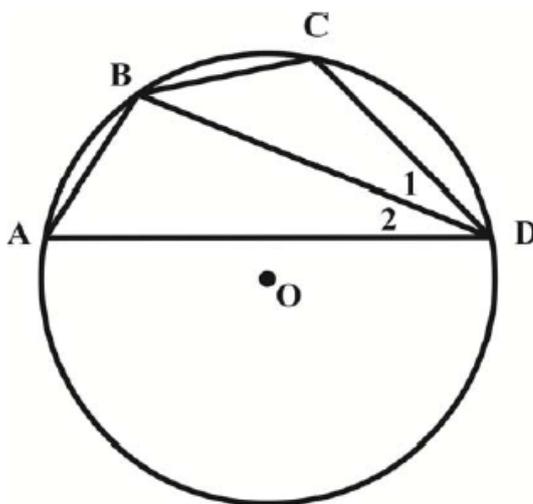
**Examples of very difficult questions**

Given a convergent geometric series with first term  $a$  and  $S_{\infty} = p$ ,  $p > 0$ .

(a) Show that  $a \in (0; 2p)$ .

This question requires insight to see how one could approach this in order to calculate the product. There is no well rehearsed procedure that can be used to tackle it.

(c) In the diagram below, AD is a chord of the circle with radius 3 units. AB and BC are equal chords of length 2 units each.



(1) Determine the size of  $\hat{D}_2$ .

This question required learners to create their own pathway to the solution. Learners need to add construction lines and think to apply trigonometry in what appears to be a circle geometry question.

#### 4. **Recommendations for improving the quality and standard of the examinations**

The team felt that the format and structure of the 2014 papers was of a good standard and provides a good model for future papers.

The one aspect of particular concern was the level of difficulty of paper 1. We felt that moderate questions predominated in paper 1 and thus would suggest in future that these should be reduced and some more easy questions and some more very difficult questions should be included.

In addition to these main concerns the team pointed out the following smaller issues for consideration of the examiners:

a) Although Paper 2 question 7 contained questions that had the potential to test insight into statistical concepts, the memo suggested that very basic reasons would earn the learner full marks or that it might be possible to guess the right answer (e.g. for question 7b2 guessing that the mean and standard deviation would double would get the learner the marks, but not necessarily

indicate that they learner had any insight into why this is so). The idea of testing conceptual understanding is an excellent one, but the questions needed to be better formulated so they do it fully.

b) Paper 2 Question 8c2 was a straight forward question, but relied on having determined the size of angle  $D_2$  in question 8c1 which was really difficult to do. Learners might simply omit this question because they were not able to do question 8c1 and this means that they would not get the chance to demonstrate that they are able to apply some of the facts of circle geometry in a straightforward context.

c) Paper 1 question 8 contained some confusing language as discussed in section 2.2 above. As many learners are not writing in their home language it is important that language used be as clear and unambiguous as possible.

## 5. **Comparability of examination papers**

### 5.1 **Comparison of overall quality (format, structure, layout, language) of the examination papers of 2014 to previous years**

Quality	Paper 1	Paper 2
2012	Similar to 2014	Slightly better than 2014
2013	Similar to 2014	Slightly better than 2014

In general the quality (in terms of format, structure, clarity, language) of the IEB papers of 2012, 2013 and 2014 have been of a good standard, although some features of the typesetting and diagrams of the 2014 were not as good as those of paper 2 of previous years.

### 5.2. **Anticipated performance of learners in 2014 in comparison to previous years**

The team's analysis of paper 1 of 2012, 2013 and 2014 suggests that the performance of learners on paper 1 of 2014 should be better than that of 2012 and 2013.

The team's analysis of paper 2 suggests that, learners who have been taught geometry well should perform in a similar way to the way they did in 2013. There should also be similar performance to the performance of learners in 2012, however there were more easy marks available in the 2014 paper 2 and thus it is possible that weak learners would have found it easier to get a 30% pass on paper 2 in 2014 than they did in 2012.

When paper 1 and 2 are combined, we anticipate that performance in 2014 should be slightly better than it was in 2012 and 2013. We anticipate that the performance of all groups of learners should improve, except perhaps those achieving high A's. The percentage of very difficult questions was similar in 2012 and 2014 and there was only a four percentage point difference between 2013 and 2014 in this category so we do not anticipate a big increase in high A's.

However, as noted in section 3.1 above, the team was cogniscent of the fact that Euclidean geometry has been reintroduced to the core curriculum for the first time since the NCS examinations were started. The team does not have data from which to assess the number of schools who write the IEB examinations where teachers might not be adequately prepared to teach Euclidean geometry. Thus it is hard to predict the exact effect this will have on performance, but the possible scenario outlined by the team in section 3.1 suggests that if learners have not had adequate preparation in Euclidean geometry they would have experience paper 2 as harder than that of 2012 and 2013 and would perform similarly on the examination overall (paper 1 and 2 combined) as in previous years.

## 2.8: Mathematical Literacy – Independent Examinations Board

### SUBJECT: MATHEMATICAL LITERACY

#### 1. Compliance with the CAPS.

##### 1.1 Format and structure

<b>Table 1 - Format and structure of Mathematical Literacy Examination Papers</b>			
<b>Exam paper</b>	<b>Focus area</b>	<b>Duration (hrs)</b>	<b>Mark allocation</b>
2014 IEB Ex P1	Mainly at the two lower levels of cognitive demand.	3	150
2014 IEB Ex P2	Mainly at the two higher levels of cognitive demand	3	150
2014 IEB P1	Mainly at the two lower levels of cognitive demand.	3	150
2014 IEB P2	Mainly at the two higher levels of cognitive demand	3	150

The 2014 IEB Final Mathematical Literacy Papers complied in every respect with the format and structure of the examination as described in the IEB Assessment Guidelines (2014).

According to CAPS,

- Paper 1 covers questions mainly at the two lower levels of cognitive demand. It consists of 5 questions. Four questions deal with each of the following Application Topic: Finance (AT1), Measurement (AT2), Maps, plans and other representations of the physical world (AT3) and Data Handling (AT4). The fifth question integrates content from across all of these topics. Probability (AT5) is included in one or more of the other questions.
- Paper 2 consists of 4 or 5 questions mainly at the two higher levels of cognitive demand and a smaller proportion at the second level. These questions are all integrated across all the five Application Topics.
- Basic Skills are integrated throughout all questions of both papers, and therefore not weighted with respect to cognitive demand. Each paper counts for 150 marks, is allocated 3 hours and both are equally weighted.

This examination format is a shift away from the NCS in which about 20% of Paper 1 consisted of de-contextualised basic numerical questions whereas in CAPS every question is set in an authentic context.

## 1.2 Cognitive demand weightings

<b>Table 2 - Comparison of the cognitive demand weightings specified and the percentage weightings for the 2014 IEB papers.</b>				
<b>Paper</b>	<b>Percentage of marks allocated to questions at each of the different types of cognitive demand</b>			
	<b>Knowing</b>	<b>Routine Procedures</b>	<b>Multi-step Procedures</b>	<b>Reasoning and Reflection</b>
2014 IEB P1	33	52	11	4
2014 IEB P2	5	28	39	29
2014 IEB Overall	19	40	25	16
CAPS for P1	60 (±5)	35 (±5)	5 (min)	0
CAPS for P2	0	25 (±5)	35 (±5)	40 (±5)
CAPS Overall	30 (±5)	30 (±5)	20 (±5)	20 (±5)

From Table 2 above, the following comments can be made about the 2014 IEB Mathematical Literacy Papers:

In Paper 1: The percentage marks allocated to Knowing is significantly lower and for Routine Procedures and Multi-step procedures significantly higher than the IEB Assessment Guidelines (AG) requirements. There should be no questions at the highest cognitive level.

In Paper 2: The compliance with the AG is good in the Routine Procedures and Multi-step Procedures, but there should be no Knowing questions and significantly more questions at the Reasoning and Reflecting level.

Overall:

As can be seen from the table the sum of the two lower levels equals the sum of the specified percentage of marks although individually there are too few marks at level 1 and too many at level 2. The team believes that there is a significant area of overlap between cognitive levels 1 and 2. This is because there is a lack of clarity about the type of question in these two levels in the CAPS. Since the CAPS gives only limited examples of types of questions at every level, the evaluation team often has difficulty in agreeing on the interpretation of the cognitive level of a question because the difference is a matter of interpretation, nuance, emphasis or degree. It is our opinion that **these two cognitive levels are actually at the same level of cognitive demand** and should be conflated into one level with two strands or types of question.

[It should be noted that the Mathematical Literacy team has created a large data base of types of questions based on years of exam evaluation which they use to classify questions. The examples are absolutely compliant with CAPS. This year the team has differentiated the types of questions with respect to cognitive level **and difficulty where possible.**]

Regarding the questions at the two highest level of cognitive demand, the team felt that there are sufficient marks at this level. However, the highest cognitive level questions are often easy marks to obtain because the CAPS regards 'making a judgement' (after solving a complex problem at level 3), 'giving an opinion' or 'verifying an assertion' as level 4 thinking. The answer is often obvious or trivial.

The marks awarded for cognitive level 4 questions at different difficulty levels in the Exemplar and the Final 2014 papers are shown in the following table:

<b>Table 2b: No. of marks awarded for cognitive level 4 questions in the 2014 IEB Examination</b>	
<b>Difficulty level</b>	<b>2014 IEB</b>

Easy	18
Moderate	25
Difficult	6
Very difficult	0

### 1.3 Comparison of the topic weightings specified with the weightings for the examination papers.

**Table 3: Comparison of the percentage topic weightings specified with the percentage weightings for the 2014 IEB paper.**

Application Topics	2014 IEB			CAPS
	P 1 (%)	P 2 (%)	Combined Overall (%)	Specified Combined Overall (%)
Finance	35	35	35	35 ( $\pm 5$ )
Measurement	15	23	19	20 ( $\pm 5$ )
Maps, Plans,	23	9	16	15 ( $\pm 5$ )
Data Handling	21	28	25	25 ( $\pm 5$ )
Probability	9	5	7	5 (min.)

**For the 2014 IEB Paper:** As can be seen from the table above there is very good overall compliance with the weighting of Application Topics as stipulated in the CAPS. The CAPS does not specify weighting per paper of the Application Topics.

### 1.4 The rating for coverage of the examinable curriculum.

**Table 4: Coverage of examinable curriculum in 2012, 2013 and 2014 IEB papers.**

	Paper 1	Paper 2	Combined overall
2012 IEB	Most of the curriculum	Most of the curriculum	Almost all
2013 IEB	Most of the curriculum	Most of the curriculum	Almost all
2014 IEB	Most of the curriculum	Most of the curriculum	Almost all

The design of the Mathematical Literacy examination requires that the whole curriculum be covered by the two papers which are equally weighted. Therefore it is unrealistic to expect that each paper will cover the whole curriculum. The sub-topics that were omitted constitute very little of the total number in the whole curriculum.

**Table 5: Topics that were omitted:**

2012 IEB	<ul style="list-style-type: none"> <li>Analyse and critically interpret a variety of financial situations mathematically, inclusive of the effects of taxation, inflation and changing interest rates.</li> </ul>
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	<ul style="list-style-type: none"> <li>• International time zones</li> <li>• Investigate a problem on issues such as those related to social, environmental and political factors, people's opinions, human rights and inclusivity' (This very difficult to assess in a written exam paper because it is best suited to classroom based assessment.)</li> <li>• Design simple contingency tables to estimate basic probabilities</li> <li>• Draw tree diagrams</li> </ul>
2013 IEB	<ul style="list-style-type: none"> <li>• International time zones</li> <li>• Investigate a problem on issues such as those related to social, environmental and political factors, people's opinions, human rights and inclusivity' (This very difficult to assess in a written exam paper because it is best suited to classroom based assessment.)</li> <li>• Design simple contingency tables to estimate basic probabilities</li> </ul>
2014 IEB	<ul style="list-style-type: none"> <li>• Loans and inflation</li> <li>• Cost price and selling price</li> <li>• Temperature</li> </ul>
In all the papers	<ul style="list-style-type: none"> <li>• Measurement of mass and volume</li> <li>• Developing questionnaires</li> <li>• Collecting data</li> </ul> <p>These topics are impossible to examine in a written examination.</p>

### 1.5 Other points regarding compliance with specified assessment requirements

The CAPS states '**it is essential that assessment items and examinations draw on realistic and authentic contexts.** Learners should be asked to interpret newspaper articles, real bank statements, real plans and other authentic resources, rather than contrived problems containing only a semblance of reality' (CAPS, page 108.) All three examinations contained contrived questions which were clearly designed to test the mathematics, instead of authentic real life problems which require mathematics to solve. See the questions listed below, which were **the worst of the contrived questions.** Many which are not listed were only weakly authentic.

2012 IEB: None

2013 IEB: P1:

Q2.2 - Not likely to be an actual advert.

Q3. – Contrived in order to test mathematics, contained repetitive substitution into formulae, required little understanding.

Q4.1.3 - 4 Contrived and unlikely in real life.

2014 IEB: P1:

Q4.3 – This looks like a contrived question. An electoral officer would find it difficult to count 5 876 voters making their mark in **one** hour, let alone keep doing the counting for 12 hours. Since our voting system is a manual one there is no way this is an authentic context question.

Q5.4 – This is a contrived question too and a ludicrous one. Why would anyone need to know how many cars would 'fit' onto a six lane bridge. Car length divided into bridge length means bumper to bumper! It is clear the examiner had a need to test certain mathematical skills and so invented a fictitious context.

P2: None.

## 2. Quality of examination papers

### 2.1 Invalid sources of question difficulty or ease

<b>Table 6: Number of questions assessed as having invalid sources of difficulty or ease.</b>		
<b>Paper</b>	<b>Number of questions</b>	<b>Number of marks</b>
2012 IEB P1	0	0
2012 IEB P2	0	0
2013 IEB P1	1	4
2013 IEB P2	0	0
2014 IEB P1	2	7
2014 IEB P2	0	0

The following comments provide details of the invalid sources of difficulty that were found:

2012 IEB - None

2013 IEB

- P1Q5.2 – It was impossible to distinguish the grey shades of the graph and match them to the key. Many candidates could have lost the 4 marks for this question.

2014 IEB

- P1Q1.2.2 (b) - The graph in the mark memo is incorrect after 22:00 on horizontal axis. A rate for 'one hour or part thereof' should be drawn as a horizontal line with an empty point at the left hand end. High achieving candidates who drew the graph correctly would have lost 5 marks.
- Q2.3.1 - Plan has a grey shadow which could confuse candidates for accurate measurement. My printed version did not fall within the range of measurements of the mark memo. Some candidates might have lost 2 marks for 'incorrect' measurement.

In 2014 IEB P1 5 marks were impossible to attain and 2 were at risk of not being attained. This constitutes 2.3% of the marks for the exam. This is unacceptable. Time spent on these questions may have negatively affected the attention given to further questions.

## **2.2 Other points regarding the quality of the examination**

### **2.2.1 Language level:**

Because Mathematical Literacy uses a lot of text examiners need to be sensitive to the use of unusual English idioms, phrases or words.

2012 and 2013 IEB

2012 IEB and 2013 IEB: In both Paper 1 and Paper 2 the language level was appropriate and accessible. The instructions and the questions were clear there was no unnecessary wordiness. For the most part the language was appropriate and concise.

Some difficulties were apparent.

2012 IEB P1

- Q5.3 - 'amount' of tiles should be 'number 'of tiles. And 'beige' is not a familiar colour in print.

2012 IEB P2

- Q1.2 – 'her monthly repayment was reduced to R 992,80'. Some learners could have inferred that this was from then onwards, not just for that month, as the mark memo intended.
- Q 4.1 – 'as the crow flies' is idiomatic and therefore not necessarily understood by every candidate.

2013 P2

- Q 4.3 – Use of 'a robot' is unfortunate. Traffic lights would have been better.

2014 IEB P1

- Q2.3.4 Should say 'Convert this ratio 'to' grams: litres not 'in'.
- Q2.5 Spelling of speckels is incorrect. Should be speckles.
- Q3 – Map uses the terminology 'paved and unpaved' describing roads across Africa. While learners only needed to follow the key's instructions, for

some learners this would have been confusing. In SA the key would have said 'tarred and untarred or dirt'.

- Q4.2 'How many seats were accounted for in the 2009 elections?' According to the mark memo the question should have actually been "How many seats were allocated to the top four parties in the 2009 elections?"

2014 IEB P2

- Q2.1.1 'Itinerary' might be an unfamiliar word
- Q3.3 – 'capacity' misspelt
- Q5.1 – The interest should be '12,5% p.a.'
- Q5.2 'Excess' might be unfamiliar word.

## 2.2.2 Format of questions

### a. Technical difficulties.

2012 IEB

- No technical difficulties were found.

2013 IEB

- In P1 Q5 in was difficult to distinguish the different shades of grey on the bar graph which made interpretation more difficult.
- Annexure A, which was a plan of a shopping mall, was blurred in the print version and the key was almost impossible to read.

2014 IEB

- In P1 Q2 required measurement of distances on a house plan. Firstly the printed version that the team used did not have measurements that fell within the range of values in the mark memo. Secondly, the plan had a grey shadow along the length of some walls and it was not clear whether the measure from the shadow or the black line next to it.
- In P2 Q1 used a map showing e-tolls. One of the questions asked learners to look at certain numbered roads. The road numbers were very faint and very small. This might have increased difficulty for some learners who were unfamiliar with the geographical area.
- In P2 Annexure 3 should have included the vertical scale and axis label on the Male infant graph.

### b. Misleading/Problem questions

The following comments provide details of misleading or problem questions that were found:

2012 and 2013 IEB

None

2014 IEB

P1

- Q1.2.1 - The question should have indicated that the values on the table indicate the cost at the end of the time indicated on the table, in other words. Some learners may think that these values indicate the cost per time given, and if added, they give the total cost at the end of the duration of the party.
- Q1.3.1 – Too many marks for reading a simple date from a till slip. Not a Grade 12 question!
- Q1.3.3 - Contrived parking information board. In real life, parking fees operate according to a sliding scale.
- Q2.3.4 – The question should have stated 'Convert this ratio to 1 gram: ....litres' to match the only allowed answer on the mark memo.
- Q3.5.1-2 - Completing sentences is not a good way of asking questions
- Q3.5.3(a) -Contrived question. Real distances between towns are never worked out in mm!
- Q5.3 - 100% in question paper, should be 100. Then the answer will be a percentage.

P2

- Q1.4 – The map used was very detailed and contained lots of information which needed to be processed in order to give the correct solution. Candidates living in Gauteng would have had an advantage over other students.
- Q3.4 – The actual calculation contains three errors, not two as the question states. Mark memo does not give the third error. Was the third error intentional? ('798 278 693,3' should be '797 874 000')

### **c. Format**

2012 and 2013 IEB

Both papers are good models for future use with respect to format. The layout was clear and not crowded. The text demanded a high reading competence because of the amount of text. No typographical or mathematical errors were found in either paper.

2014 IEB is a good model with respect to format except for the numbering system. The team felt that questions based on the same source material should be numbered consecutively and not break down into sub questions. See P1 Q3 for

example. 3.3 and 3.5 are redundant numbers and refer to nothing. The whole question could have been numbered 3.1 – 3.10, with no further sub-sections.

### **2.2.3 Contextualization of questions**

In Mathematical Literacy, where 'context is everything' the contextualization of questions cannot be divorced from the stimulus material.

2012 and 2013 IEB

The 2012 and 2013 IEB papers used almost exclusively up-to-date, authentic source material which was from real-life problems. The interest level was therefore very high.

2014 IEB

P1:

- Q4.1 – An interesting and very topical context. Good to see South African political issues included.

P2:

- Q1 – Payment for e-tolls – an altogether a relevant context in the present time in our country.
- Q1.6 - Unusual and good way to test following directions on a map.
- Q2.1-2 An interesting travel context which assessed many topics in an integrated question.
- Q4 - A good context as it educates and creates awareness about the status of rhinos in South Africa in many of our young people.

### **2.2.4 Inappropriateness of stimulus material:**

The source materials are very important in this subject. However, in all the papers, the stimuli were relevant, accessible, authentic and interesting.

2014 IEB

P1: Not all the stimulus material in this paper was appropriate.

- Q1.3.3 – an entirely fictitious parking information board.
- Q3 and Q 5- Good to see actual maps used. More challenging than diagrammatic maps.
- Q4.1 – Real data with actual photos of political party leaders used in quite a complex table of information. This would have provided challenge for some learners.
- Q4.3 – a contrived histogram.

P2: All the stimulus material in this paper was appropriate.

- Q1 – Excellent diagrams to explain technicalities accompanied the photo image of the e-toll tariff table.
- Q4 – The use of data from the Dept of Environmental Affairs gave authenticity and challenge to this question, as did the most unusual graph in Q 4.7.

### 2.2.5 The inadequacy and inaccuracy of marking memorandum

Disclaimer: These comments are based on the version of the marking memo given to the team by Umalusi at the start of the evaluation in every year. A later version of the marking memo would have undoubtedly corrected the errors.

2012

Not analysed

2013

The marking memo was deemed adequate and error free.

2014 IEB

Unfortunately many errors or inconsistencies were found in both mark memos.

P1:

- Q1.2.2(a)- At the time of answering that question only one graph as drawn so labels should reflect that, not both graphs. Memo should allow for this option.
- Q1.2.2(b)- The graph is incorrect after 22:00 on horizontal axis. A rate for one hour **or part thereof** should be drawn as a horizontal line with an empty point at the left hand end, for each successive hour. But in Mathematical Literacy students are not taught about the empty point.
- Q1.2.2-3 -Although mark memo indicates a total of 10 marks there are more than 10 ticks on the memo. It is not clear why the 2 ticks for DJ Amazing are awarded.
- Q1.3.2 Answer on memo should allow for units or decimal fraction of an hour as the type of answer is not specified.
- Q2.1 and 2.2 - Similar skills/questions and 2 marks each – too easy and too many marks
- Q2.3.2 - Memo does not allow any marks for actually using the scale to find 7,6.
- Q2.3.4 - If mark memo does not allow 1 000g : 6 litres, it makes this an question with invalid difficulty.
- Q2.4.1 - Too few marks for two calculations that are not that easy conceptually.
- Q2.5.2 - Memo needs to allow full marks for answer only. As all the tiles have either one or two colours, the probability can be done without calculation. Therefore too many marks for this question.
- Q3.4 - Memo is misleading. If you insist on only **two** highways, the answer '4' should not be part of the memo. Only answer is 5 and 6.

- Q5.1.(a) - Numbering in mark memo does not correspond with question paper. Swaziland is not given as a possible country west of Mozambique, which it is.
- Q5.4.1 – Units asked for are *metres*. Mark memo gives *kilometres*.

P2:

- Q2.2.2 -Unfair discrimination towards students who did the second option which gives the correct answer of £1 335. Why do they lose 2 marks? The value used in the third line of the first method is not correct; R24 537,50 should be R24 545,90.
- Q3.1.4 – Memo is incorrect. Girl is a little higher, not lower, on the graph.
- Q3.2.1 - Mark memo must allow for decimal fraction since it asks only for the probability as a fraction, which means either common or decimal.
- Q 3.3 – Learners can also divide by 2 to check if it is half of 200litre. Allow full marks for this method.
- Q3.4 - More than two errors. Incorrect use of pi (if 3,14 is used, the answer will be different). Final answer should be in terms of *litres*, as it is in the question.
- Q4.4.2 – R3 905 541 000 rounds off to R3 906 000 000 not R3 905 000 000.
- Q4.6 - Poorly worded question leads to inconsistencies in the mark memo, which doesn't allow for more than one possible answer. The fact that the range is smaller doesn't necessarily mean that it is a good thing. Since the question is hypothetical if the lower value was bigger it would mean **more** rhinos had been killed.
- Q4.10 Only answer should get full marks. Can be done in one's head or read directly off the graph.

### 2.2.6 Good questions as models for future use:

The team considered that both the IEB papers contained many questions which were **good models** for future use. The examples from 2012 exam follow:

2012 IEB Paper 1

- The whole of question 1 is a good question which assess a wide range of skills and concepts
- 1.13 was a good questions because use of tree-diagram is unfamiliar but based on real life
- 1.9 is a very good value for money question, using authentic material
- 1.10 very good question to test 'measuring'
- Q2 is a good question as it tests concepts rather than calculations
- Q4.6 seating plan very good question, deep understanding of spatial understanding
- Q6 is a good way of addressing sampling

2012 IEB Paper 2

- Q1 – 1.4.2 – An error on calculator is something that most students who use a scientific calculator have seen before. It might be a problem for students who do not own a scientific calculator. Required deep understanding.
- Q3.2.2 – identifying the dam from the pictures is a very realistic question, which makes students think about the scenario, therefore more meaning.
- Q 5.1 – complex question, not too easy

#### 2013 IEB Paper 2

- Q4.2.2 (a) – This question tested deep understanding of a graph in a very clear and unambiguous way.
- Q4.5 – Tested understanding of the meaning of graphs well.

#### 2014 IEB

##### P1:

- Q 1.1.4 - The graph is given as an amount earned, but the question requires the interest earned. Challenging.
- Q1.4.1 - Brilliant question to determine compound interest without equation.
- Q2.3.4:- It is very good to see a conversion question integrated with another section, i.e. ratios.
- Q4 is based on the real data that is relevant to our learners. The context is also an issue of national interest.

##### P2:

- Q1 – All of it! Completely authentic, many factors have to be considered, lots of application topics
- Q1.4 - Diagram which supports gantry question was very well set out and explained
- Q2.1.3 – Simple but good question which tests conceptual knowledge of time zones.
- Q 4 - Relevant question creates awareness. Uses unusual graphical stimuli which require good interpretation skills
- Q5.1 - Would be a good question if the wording 'per annum' had followed the interest rate.
- Q5 has a very interesting context, as it is pitched at international level. This is a typical context for grade 12 learners.

### 2.3 Rating the quality of examination papers

2012 IEB	Paper 1	Good
	Paper 2	Good
2013 IEB	Paper 1	Good
	Paper 2	Good
	Paper 2	Fair
2014 IEB	Paper 1	Fairly good
	Paper 2	Fairly good

The IEB 2014 papers could not be deemed good mainly because of the poor quality of mark memo which the team saw.

### 3. Standard of the examination papers

#### 3.1 Levels of difficulty

<b>Table 8: Percentage of marks awarded to different levels of difficulty in the IEB examinations papers.</b>					
	<b>Easy</b>	<b>Moderate</b>	<b>Difficult</b>	<b>Very Difficult</b>	<b>Invalid</b>
<b>Paper 1</b>					
IEB 2012 P1	42.8	53.1	4.3	0	0
IEB 2013 P1	50	46.3	3.2	0.3	0.3
IEB 2014 P1	57.3	28.7	9.3	0	4.7
<b>Paper 2</b>					
IEB 2012 P2	20.9	62.3	12.4	4.4	0
IEB 2013 P2	15.9	58.5	19.5	4.4	1.7
IEB 2014 P2	26.7	64.0	10.0	0	0
<b>Overall</b>					
IEB 2012	31.85	57.7	8.35	2.2	0
IEB 2013	32.95	52.4	11.35	2.35	1
IEB 2014	42.0	46.3	9.7	0.0	2.3

#### a. Questions with unresolved differences (of difficulty)

2014 IEB P1: None

2014 IEB P2: Q3.3 (5 marks) – Two members wanted it at level 3 difficulty and three at level 2 difficulty.

Q3.5 (4 marks) - Two members wanted it at level 3 cognitive demand and three at level 2 cognitive demand.

In 2014 IEB approximately 19 marks in P1 and 15 marks in P2 were at risk of not being attained unless the mark memo was altered. This is unacceptably high number of marks at risk. This constitutes 11.3% of the marks for the exam.

## **b. Invalid questions**

See 2.1 above.

## **c. Allocation of marks at each level of difficulty**

### 2012 IEB

The overall result showed that the exam was fairly balanced with respect to levels of difficulty. Paper 1 is clearly easy and would allow for the average learner to achieve a pass. Overall only 10 % of its questions were of a difficult or very difficult degree. This would not have allowed for good differentiation of the A grade candidates.

### 2013 IEB

The overall result showed that the exam was easy. Paper 1 was clearly too easy (50% of the marks were awarded for easy questions) and would allow for less-than-average learners to achieve a pass. Overall 14 % of its questions were of a difficult or very difficult degree. This would not allow for very good differentiation of the A grade candidates.

### 2014 IEB

The overall result shows that the 2014 IEB paper is easier than the past two years. While there were almost an adequate number of marks at the Difficult level there were too few Very Difficult questions and far too many Easy questions, especially in Paper 1. The outcome of this would be that this exam would allow for a general shift of marks upwards, and the true A-grade candidates would not be well differentiated by this exam. The problem incurred by the wrong graphs in the mark memo also contributed to a relatively high number of marks of Invalid Difficulty for a question which would otherwise have been Difficult.

While it not possible to be prescriptive about the specific distribution of levels of difficulty there is a sense in the team that the distribution should look something like this:

Easy	Moderately Difficult	Difficult	Very Difficult
30%	40%	20%	10%

This distribution would enable the examination to enable average learners to obtain 30% and also really discriminate at the top end to identify A-grade achievers at an acceptable Grade 12 exit-level.

### 3.2 Examples of questions at each level of difficulty

Table 9: Examples of questions at different levels of difficulty in 2014 final papers						
	Difficulty level	Question				
2014 IEB P1	Easy	Q1.1.2 Which kind of interest increases by a constant amount, simple or compound interest?				
	Moderate	Q2.5.2 From the following list of tiles below: <ul style="list-style-type: none"> <li>• Beige tile with brown speckles</li> <li>• Plain white tile</li> <li>• Beige tile with brown stripes</li> <li>• Plain brown tiles</li> <li>• Black tile with white spots</li> </ul> Calculate the probability of picking a tile that has either one or two colours in it.				
	Difficult	Q5.2.2 Using the exchange rate table below, convert the US\$ 7,25million to Chinese Yuan (¥). You may use the following conversion table. <table border="1" style="margin-left: 20px;"> <tr> <td>1 ZAR (South African Rand)</td> <td>= 0,089 US\$ (United States Dollar)</td> </tr> <tr> <td>1¥ (Chinese Yuan)</td> <td>= 1,84 ZAR</td> </tr> </table>	1 ZAR (South African Rand)	= 0,089 US\$ (United States Dollar)	1¥ (Chinese Yuan)	= 1,84 ZAR
	1 ZAR (South African Rand)	= 0,089 US\$ (United States Dollar)				
1¥ (Chinese Yuan)	= 1,84 ZAR					
Very difficult	None					
2014 IEB P2	Easy	Q2.1.1 Calculate, in hours and minutes, the waiting time at Dubai International Airport. (Given in a table of flight information that the flight arrives in Dubai at 05:25 and departs from Dubai at 07:25.)				
	Moderate	Q5.3.3 Lines C and D lie very close to each other. By referring to the context, explain what this means. The question does not state what C(Lower Quartile) and D(Median) are. The learner has to know what they are.				
	Difficult	Q4.9 Give a possible reason for the decline in the projected number of rhinos poached between 2023 and 2024. (The source material for this question is an unusual graph showing a downwards curving rhino population from 2012 and at the same time an upwards curving number of rhinos poached. Just before the lines intersect the number of rhinos poached dips in 2023 till 2024.)				
	Very difficult	None				

### 3.3 Difficulty of stimulus/source material

This has been dealt with extensively the section headed Format above. It should be noted, however, that the complexity and authenticity of the stimulus material has substantially improved since 2012. The material is based on relevant information and much less contrived. There is also a fair amount of careful reading required to solve the problems in the papers.

### **3.4 Other points regarding the standard of the examination (all 2012-2014)**

The team is of the opinion that none of the examinations include sufficient questions at the difficult level and very difficult level to satisfy a deep assessment of the subject knowledge. (Refer to Table 8.) In addition, there are far too many questions which are not appropriate for Grade 12 assessment of the subject because they are too easy and too predictable.

## **4. Recommendations for improving the quality and standard of the examinations**

The following recommendations are made regarding the standard: (for 2014 papers)

- The papers need to consist completely of authentic, real-life problems (preferably sourced from authentic sources like StatsSA, UNESCO, WWF, newspapers, articles of interest in focus magazines etc.) and from people in occupations where quantitative issues are concerned (doctors, environment consultants, marketing managers, etc.)
- The papers need to have **significantly more questions at the two higher cognitive levels** which test conceptual understanding, reasoning and interpretation of data and answers.
- The papers need to have **much more difficult Grade 12 exit-level questions**, which require thinking, problem solving and ability to handle “non-cosmetic” numbers (real numbers which have many decimal places and awkward percentages).
- It would extremely helpful if the examiners could come to a shared understanding of cognitive level and difficulty with the moderators and Umalusi evaluators about the levels of difficulty and cognitive demand.
- The Umalusi team could share it's extremely detailed taxonomy of questions at different cognitive and difficulty levels which has been compiled from the CAPS and the two 2014 papers.

The following recommendations are made regarding the quality:

- The quality of the printing and the checking of the printing per province needs to be monitored. If the printing varies from province to province then allowance needs to be made for this in the mark memo.
- It is also unacceptable to have errors in the marking memo. This would seem to indicate a lack of proper checking by either the examiner or moderator. Both question papers and marking memos should be error free.

## **5. Comparability of examination papers**

## 5.1 Comparability of quality

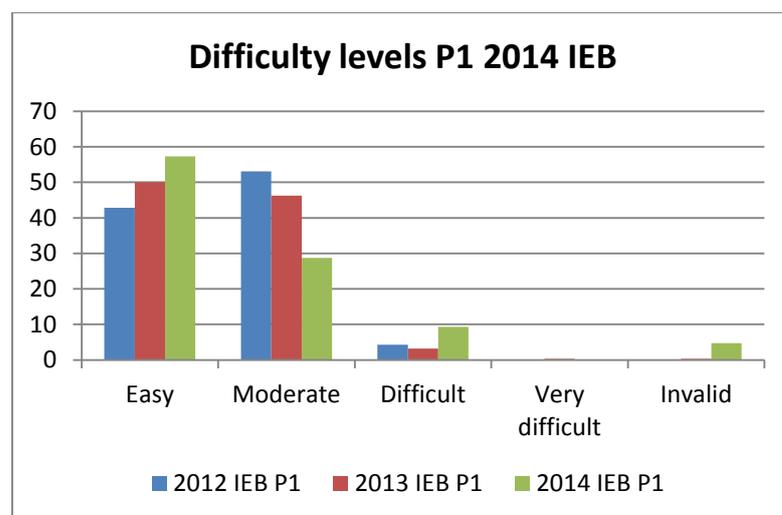
<b>Table 10: Comparability of quality</b>			
<b>Paper</b>	<b>2014 IEB P1</b>	<b>2014 IEB P2</b>	<b>2014 IEB Overall</b>
2012 P1	Much better than		
2012 P2		Much better than	
2013 P1	Much better than		
2013 P2		Much better than	
2012 Overall			Much better than
2013 Overall			Much better than

The quality of the 2014 IEB papers was better mostly with respect to the type of question. The earlier years' papers had many more contrived questions, awkward and unnecessary diagrams or merely illustrative images. The 2014 papers also had more very challenging questions although, like the other years, still focussed on the easy type of question. The 2014 papers have fewer language issues and fewer technical problems although the marking memo is still problematic.

## 5.2 Comparability of standards

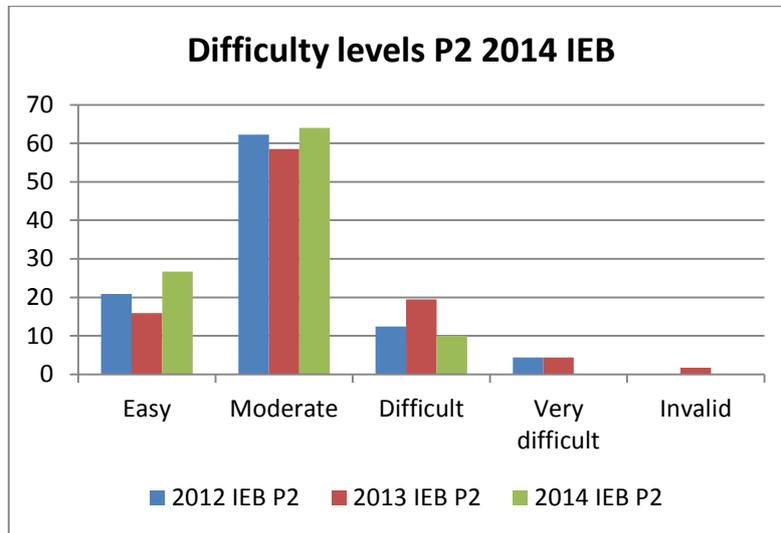
The difficulty levels for the 2012 IEB and 2013 IEB examinations (which are of a comparable standard) were compared with the 2014 IEB examination paper by paper and as an overall comparison of the whole examination. The graphs below show the comparison of difficulty levels clearly.

### IEB Paper 1 Levels of Difficulty



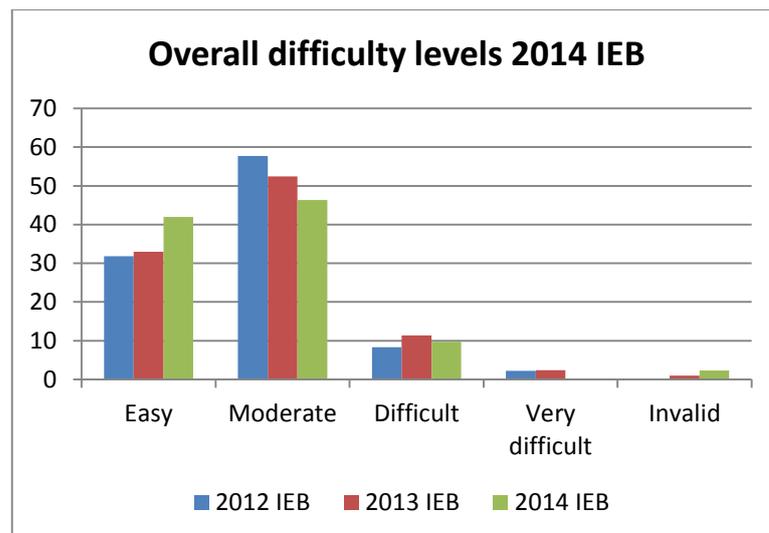
From the graph it can be clearly seen that the 2014 P1 is easier than the previous two years' Paper 1. The high number of marks (57.3%) of the paper at the Easy level is very problematic as is the lack of marks at the Very Difficult level.

### IEB Paper 2 Levels of Difficulty



From the graph it can be clearly seen that the 2014 P2 is comparable to the 2012 P2 but easier than the 2013 P2. It is of concern that there are no marks at the Very Difficult level and too many Easy level questions.

### Combined Paper 1 and Paper 2 Levels of Difficulty



The combined graph shows why the 2014 IEB examination is too easy.

- The only 2014 category of marks which is higher than all previous years is the Easy difficulty level (9.05% more than the next highest).

- 88,3% of the marks for the combined paper 1 and paper 2 are at the Easy or Moderately Difficult levels. This is too high and will result in candidates obtaining passes too easily and higher grades than they really deserve.
- Only 9.7% of the marks are awarded for Difficult questions and there are no Very Difficult questions. This means that there is not enough challenge in this exam to sift out the top achievers. There will be too many A-Grade passes.

The table below summarizes the information above.

<b>Table 11: Rating the standard of the 2014 paper(s) against the other papers</b>		
<b>Paper</b>	<b>2014 IEB P1</b>	<b>2014 IEB P2</b>
2012 IEB P1	Less demanding	
2012 IEB P2		Comparable demand
2013 IEB P1	Less demanding	
2013 IEB P2		Less demanding
Combined P1 & 2	2014 is less demanding	

### **Conclusion**

While the 2014 IEB paper complies in many areas with what is required of a Grade 12 exit-level examinations it is regrettable that this examination was too easy. It seems that the challenge to the examiners is to devise questions that are more challenging than the Moderately Difficult ones and to think up ways of asking questions at the highest level of cognitive demand (Reasoning and reflecting) that are not merely a judgment which is easy to make or an opinion which can be any opinion, provided it is justified. These marks are easy to earn!

It is the team's assessment of the paper that the overall performance trends of the learners writing Mathematical Literacy in 2014 will appear better than previous years only because they have answered a less demanding question paper.

## 2.9: Physical Sciences – Independent Examinations Board

### SUBJECT: PHYSICAL SCIENCES

#### Compliance with the CAPS

#### Format and structure

Exam paper	Focus area	Duration (hrs)	Mark allocation
IEB P1 2012	Physics	3	200
IEB P1 2013	Physics	3	200
IEB P2 2012	Chemistry	3	200
IEB P2 2013	Chemistry	3	200
IEB P1 2014	Physics	3	200
IEB P2 2014	Chemistry	3	200

In Table 1 above, the IEB Physical Science papers that were analysed for 2012 to 2014 are presented. The papers were consistent with the required format in all cases.

The format and structure of the examinations is appropriate for a Grade 12 examination.

#### Cognitive demand weightings

Paper	Percentage of marks allocated to questions at each of the different types of cognitive demand			
	Recall	Comprehension	Analysis, Applications	Evaluation, Synthesis
IEB P1 2012	12%	31%	56%	2%
IEB P1 2013	11%	22%	67%	0%

IEB P2 2012	27%	28%	43%	3%
IEB P2 2013	22%	23%	44%	2%
IEB P1 2014	14%	14%	67%	6%
IEB P2 2014	25%	29%	40%	2%
Handbook for P1	15%	35%	40%	10%
Handbook for P2	15%	40%	35%	10%

From Table 2 above, the following comments can be made about the 2014 November papers:

- The 2014 Paper 1 has a very high percentage of "Analysis, Application" questions, at the expense of "Comprehension" and "Evaluation, Synthesis"
- The 2014 Paper 2 has a higher percentage of "Recall" questions (at the expense of "Comprehension") than stipulated in the IEB Examination Handbook.

**Table 3 - Comparison of the cognitive demand weightings specified and the weighting for examination papers combined**

Paper	Cognitive demand weightings specified and the percentage for the paper(s) analysed			
	Recall	Comprehension	Analysis, Applications	Evaluation, Synthesis
IEB P1 2014	14%	14%	67%	6%
IEB P2 2014	25%	29%	40%	2%
IEB 2014 Combined	19%	21%	53%	4%
Handbook for P1	15%	35%	40%	10%
Handbook for P2	15%	40%	35%	10%
Handbook Averages	15%	37.5%	37.5%	10%

For the combined Physical Science 2014 papers (with reference to Table 3 above):

- The 2014 combined Paper 1 and 2 has a high percentage of "Analysis, Application" questions, at the expense of "Comprehension" and "Evaluation, Synthesis" questions.

However, it needs to be borne in mind that these categories of cognitive demand are very difficult to judge accurately for Physical Sciences examinations, as they do not adequately describe the types of thinking that are typically involved. As a result, different evaluators might arrive at varying judgments on these. One can therefore not make strong judgments on the basis of these percentages. The levels of difficulty are far more informative for Physical Sciences examinations (see Sections 3.1 and 5.2 of this report).

### Topic or content and/or skills area weightings

<b>Table 4a: Comparison of the topic or content and/or skill weightings specified in the IEB Handbook with the weightings for Paper 1</b>							
	<b>Paper 1 Content Categories</b>						
	K	NL	MIW	GE	EC	ED	PE
Handbook	25%	15%	15%	10%	15%	12%	8%
Paper 1	14.5%	27.0%	13.5%	11.0%	15.5%	11.0%	7.5%

**KEY:** K=Kinematics; NL=Newton's Laws; MIW=Momentum, Impulse, work, Energy Power; GE=Gravitational and Electrical Fields; EC=Electrical Circuits; ED=Electrodynamics; PE=Photons and Electrons

From this table the following can be concluded:

- Newton's Laws are over-represented, at the cost of Kinematics. However, some of the questions straddle these two fields, and so these percentages are open to interpretation.
- The other content areas are close to the stipulated percentages

<b>Table 4b: Comparison of the topic or content and/or skill weightings specified in the IEB Handbook with the weightings for Paper 2</b>							
	<b>Paper 2 Content Categories</b>						
	QC	CB	ER	CE	AB	EC	OC
Handbook	10%	10%	10%	15%	15%	20%	20%
Paper 2	8.0%	11.0%	10.5%	18.0%	10.0%	20.5%	22.0%

**KEY:** QC=Quantitative Chemistry; CB=Chemical Bonding; ER=Energy Change and Rates; CE=Chemical Equilibrium; AB=Acids and Bases; EC=Electrochemistry; OC=Organic Chemistry

From this table the following can be concluded:

- All content areas are close to the stipulated percentages (within 5% of the stipulated averages).

### Coverage of examinable curriculum

<b>Table 5 - Coverage of examinable curriculum in each paper</b>	
<b>Paper</b>	<b>Coverage of Content Areas</b>
IEB P1 2012	All of the curriculum is covered as per IEB Handbook
IEB P1 2013	All of the curriculum is covered as per IEB Handbook
IEB P2 2012	All of the curriculum is covered as per IEB Handbook
IEB P2 2013	All of the curriculum is covered as per IEB Handbook
IEB P1 2014	All of the curriculum is covered as per IEB Handbook
IEB P2 2014	All of the curriculum is covered as per IEB Handbook

It should be noted that the content stipulated for examination in the IEB Handbook differs from that in the CAPS document in certain areas. Hence not all of the material outlined in the CAPS curriculum is examinable in the IEB examinations.

The questions in the papers sufficiently covered the IEB curriculum, and none of the questions pertained to non-examinable material.

### Quality of examination papers

#### Invalid sources of question difficulty or ease

<b>Table 6 - Number of questions assessed as having invalid sources of difficulty of ease</b>	
<b>Paper</b>	<b>Number of Questions</b>

IEB P1 2012	0
IEB P2 2012	0
<b>Total for 2012</b>	<b>0</b>
IEB P1 2013	0
IEB P2 2013	3
<b>Total for 2013</b>	<b>3</b>
IEB P1 2014	0
IEB P2 2014	0
<b>Total for 2014</b>	<b>0</b>

The following comments provide details of the invalid sources of difficulty that were found:

- IEB 2013 P2 Question 1.6 (None of the given answers is correct)
- IEB 2013 P2 Question 7.5.2 (Misleading wording of the question)
- IEB 2013 P2 Question 7.6 (Assumptions made about learners' general knowledge which marginalises many learners)

Since there were no invalid sources of difficulty found for the 2014 papers, there will be no impact on learner performance.

### **Other points regarding the quality of the examination**

All the papers were clearly laid out, well structured and of a good quality. No typographical errors were found, nor errors of question or section numbering, nor errors in resource material. In addition, the language was straightforward, and kept to a minimum, and therefore should be accessible to learners working in their second language.

The team considered the IEB examinations that have been analysed to be good models for future examinations in terms of their structure, layout and clarity.

### **Rating the quality of examination papers**

<b>Table 7 - Ratings for the quality of examination papers</b>	
<b>Paper</b>	<b>Number of Questions</b>
IEB P1 2012	Good
IEB P1 2013	Good
IEB P2 2012	Good
IEB P2 2013	Fair
IEB P1 2014	Good
IEB P2 2014	Good

### Standard of the examination papers

#### Levels of difficulty

<b>Table 8: Percentage of marks awarded to the different levels of difficulty in the examination paper(s)</b>					
	<b>Easy</b>	<b>Moderate</b>	<b>Difficult</b>	<b>V.Difficult</b>	<b>Invalid</b>
<b>Paper 1</b>					
IEB 2012 P1	9%	65%	23%	4%	0%
IEB 2013 P1	7%	65%	27%	2%	0%
IEB 2014 P1	3%	40%	48%	11%	0%
<b>Paper 2</b>					
IEB 2012 P2	12%	62%	23%	3%	0%
IEB 2013 P2	12%	52%	26%	1%	4%
IEB 2014 P2	11%	56%	26%	3%	0%

<b>Table 9: Percentage of marks awarded to the different levels of difficulty for all examination papers combined</b>					
	<b>Easy</b>	<b>Moderate</b>	<b>Difficult</b>	<b>V.Difficult</b>	<b>Invalid</b>
<b>Paper 1&amp;2 Combined</b>					

IEB 2012	10%	63%	23%	4%	0%
IEB 2013	9%	59%	26%	2%	2%
IEB 2014	7%	48%	37%	7%	0%

The percentage of marks readily available to the **30% passing candidate** was determined as follows:

- 100% of the marks in the "Easy" category + 50% of the marks in the "Moderate" category, expressed as a percentage of the overall marks.

The percentage of marks readily available to the **80% candidate** was determined as follows:

- 100% of the marks in the "Easy" category + 100% of the marks in the "Moderate" category + 75% of the marks in the "Difficult" category, expressed as a percentage of the overall marks.

Table 10 below reflects these marks for all papers under evaluation:

<b>Table 10: Marks achievable by groups of learners</b>		
	<b>Marks achievable by 30% passing candidate</b>	<b>Marks achievable by 80% candidate</b>
<b>Paper 1</b>		
IEB 2012 P1	40.8%	90.3%
IEB 2013 P1	39.0%	91.4%
IEB 2014 P1	22.3%	77.6%
<b>Paper 2</b>		
IEB 2012 P2	43.0%	91.3%
IEB 2013 P2	37.5%	82.6%
IEB 2014 P2	38.8%	85.6%
<b>Paper 1&amp;2</b>		
IEB 2012	41.9%	90.8%
IEB 2013	38.3%	87.0%
IEB 2014	30.5%	81.6%

The following comments are made about these:

- In the 2014 November Paper 1 a much lower percentage of marks is accessible to the 30% passing candidate than in 2012 and 2013.
- Similarly, in the 2014 November Paper 1 a significantly lower percentage of marks is readily accessible to the 80% candidate than in 2012 and 2013.
- The standard of the 2014 November Paper 2 is similar to that of the 2012 and 2013 papers. However, these were all of a similarly low standard, and are not considered difficult enough by the evaluation team.
- For the combined papers the 2014 November paper has an **appropriate percentage of achievable marks for both the 30% and 80% learner**. The team considers the combined papers for 2012 and 2013 to be of too low a standard to accurately discern the performance of Grade 12 learners.

### Examples of questions at each level of difficulty

Easy:

- One word recall answers e.g. Provide the correct labels on a diagram of a piece of apparatus
- A very simple routine calculation e.g. "Given that the power across a resistor is 100 W and the voltage is 20 V, calculate the current through the resistor."

Moderate:

- A full-sentence recall answers e.g. "State Newton's first law in words"
- A fairly routine calculation e.g. "The siren of a stationary ambulance emits a note of frequency 1 130 Hz. When the ambulance moves at a constant speed, a stationary observer detects a frequency that is 70 Hz **higher** than that emitted by the siren. Calculate the speed at which the ambulance is travelling. Take the speed of sound in air as 343 m/s."
- Explanation of concepts that are not very complex e.g. "IMMEDIATELY after increasing the pressure, the colour of the reaction mixture in the gas syringe appears darker than before. Give a reason for this observation."

Difficult:

- Explanation of concepts that are complex, or where all possible factors should be considered e.g. "Fully explain why the boiling point increases from methane to propane."
- Non-routine, complex or multi-step calculations e.g. "Calculate the magnitude of the frictional force acting between the crate and the surface of the inclined plane."

Very difficult:

- Solving very complex problems, or problems requiring novel approaches e.g. "Use the graph of voltage versus current to calculate the internal resistance of the battery, WITHOUT USING ANY FORM OF THE EQUATION  $emf = I(R + r)$ "
- Solving problems that involve a synthesis of various concepts, e.g. "A laboratory technician wants to determine the percentage purity of magnesium oxide. He dissolves a 4,5 g sample of the magnesium oxide in 100 cm<sup>3</sup> hydrochloric acid of concentration 2 mol·dm<sup>-3</sup>. At the endpoint of the titration he finds that 21 cm<sup>3</sup> of a 0,2 mol·dm<sup>-3</sup> sodium hydroxide solution has neutralised the EXCESS hydrochloric acid. The balanced equation for the reaction between hydrochloric acid and magnesium oxide is:  $MgO(s) + 2HCl(aq) \rightarrow MgCl_2(aq) + 2H_2O(l)$ . Calculate the percentage purity of the magnesium oxide. Assume that only the magnesium oxide in the 4,5 g sample reacted with the acid."

### **Difficulty of stimulus/source material**

No issues were found regarding the level of difficulty of the stimuli or source material for any of the papers analysed. Where the stimuli were challenging, this was appropriate to the intention of the question. This issue is not very relevant to Physical Sciences examinations which tend to have limited text.

### **Recommendations for improving the quality and standard of the examinations**

The following recommendations are made:

- Some guidelines for the acceptable distribution of percentages for the levels of difficulty of the examinations should be established to set a benchmark to guide the examiners on the required standards of a Grade 12 exit level examination. This will ensure a greater continuity in the standard, and allow for the proper discrimination of levels of learner attainment.
- In future it is suggested that the standard of Paper 1 be moderated down from the standard of the 2014 paper, and that of Paper 2 be moderated upward from the standard of the 2014 paper, to allow for a more even standard across both papers.

### **Comparability of examination papers**

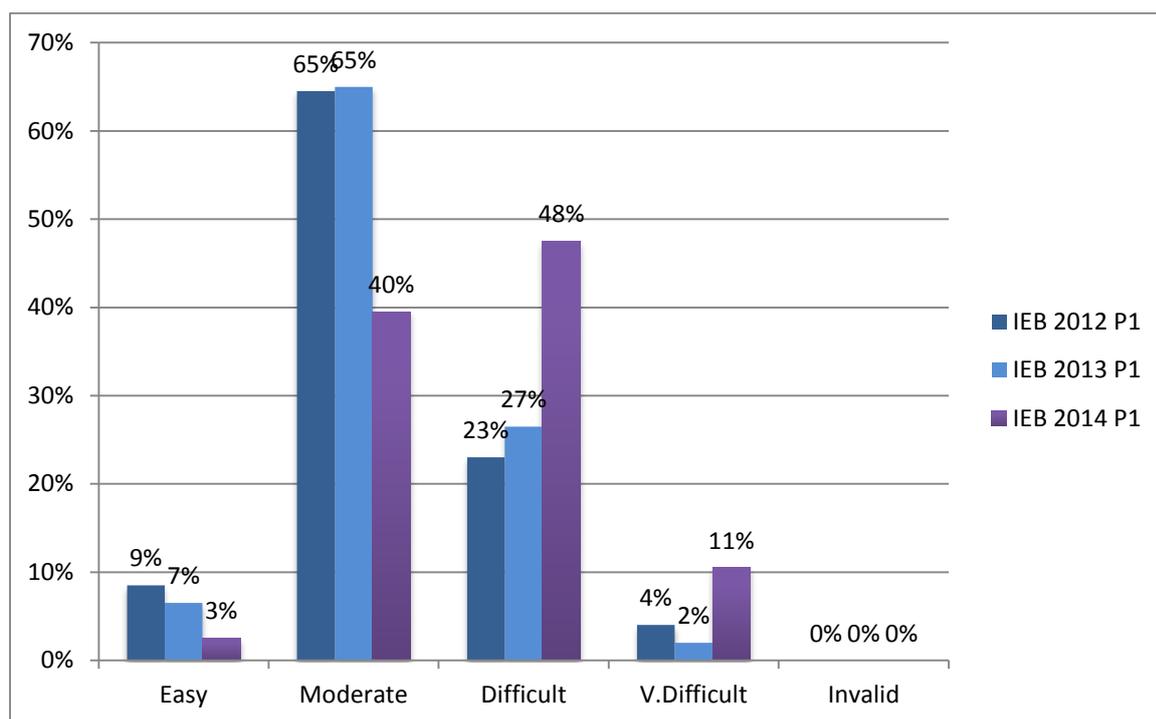
#### **Comparability of quality**

No issues with the quality of the papers were noted by the team, apart from the few questions with invalid sources of difficulty outlined in Sections 2.2 and 3.1 of this report. Hence the papers can be considered to be comparable with each other with regard to quality, structure, layout and clarity.

## Comparability of standards

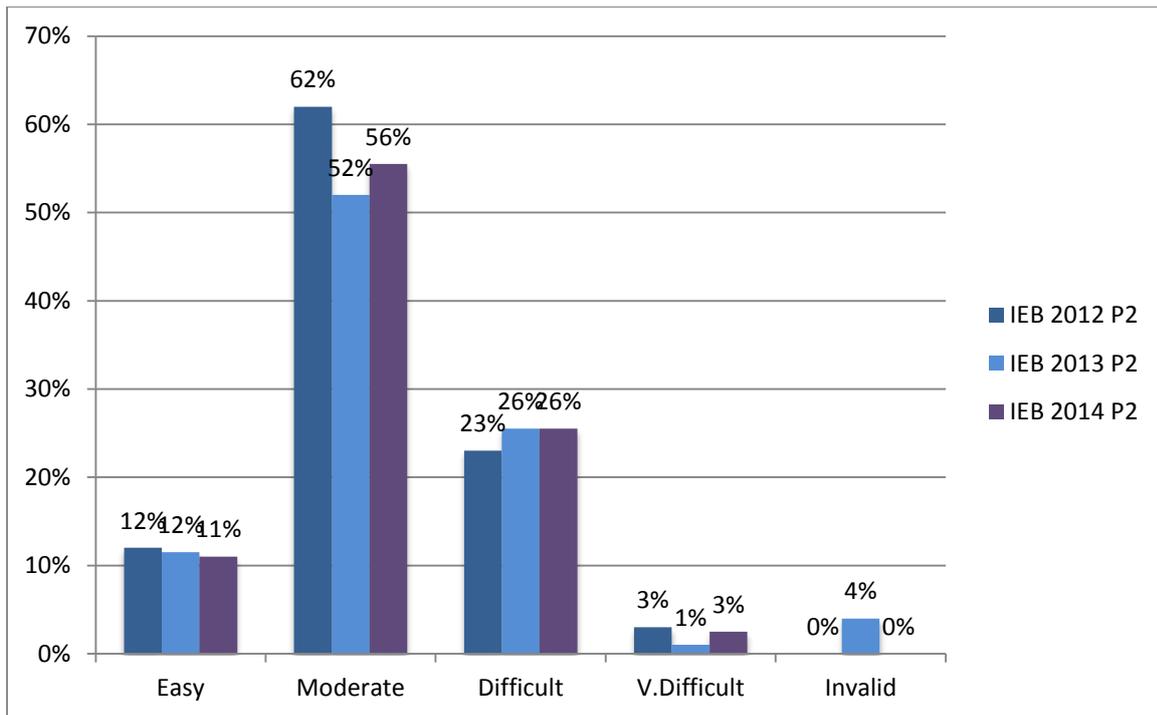
The results of the examination analysis are shown below for each of the papers, and for the combinations of the papers. We represented the information graphically, as this clearly allows the comparisons to be seen.

### **IEB Paper 1 (Physics) Levels of Difficulty:**



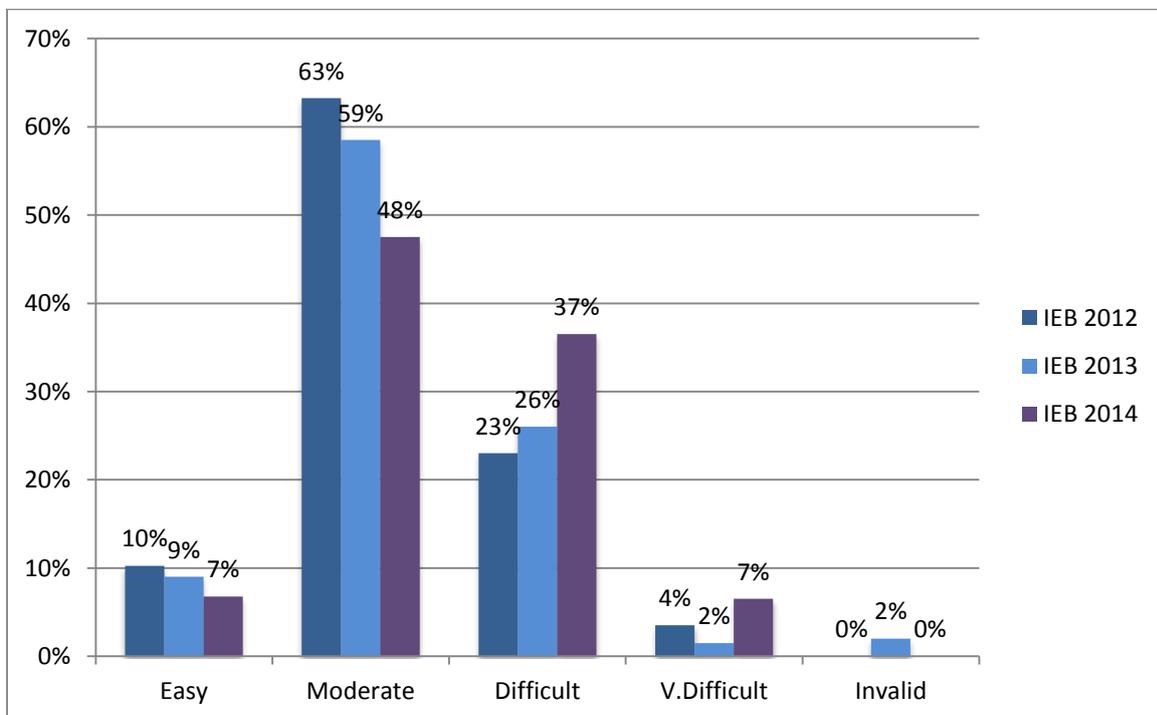
The 2014 November Paper 1 is clearly significantly more difficult than either 2012 or 2013. This can be seen by the higher percentage of "Difficult" and "Very difficult" questions, and the lower percentage of "Moderate" and "Easy" questions.

### **IEB Paper 2 (Chemistry) Levels of Difficulty:**



The 2014 November Paper 2 is comparable to the 2013 paper. The 2012 Paper 2 was slightly easier, with a higher percentage of "Moderate" questions.

### **IEB Combined Paper 1 and Paper 2: Levels of Difficulty**



The combined 2014 Physical Science Paper 1 and 2 examination is more difficult than the 2012 and 2013 combined Paper 1 and 2 examinations. The 2014 examination has a higher percentage of "Very Difficult" and "Difficult" questions, and a lower percentage of "Moderate" questions.

For the combined papers the 2014 November paper has an **appropriate percentage of achievable marks for both the 30% and 80% learner**. However, since the team considers the combined papers for 2012 and 2013 to be of too low a standard to accurately discern the performance of Grade 12 learners, the team thus concludes the following:

- **fewer learners will pass** this examination on the basis of the raw scores than in the previous two years, and
- **fewer learners will achieve a Level 7 pass** on this examination on the basis of the raw scores than in the previous two years.