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Council for Quality Assurance in
General and Further Education and Training

Predictability of the National Senior Certificate Examinations
Physical Sciences Report
DBE & IEB

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Name & Surname	Subject
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ACRONYMS/ABBREVIATIONS

CAPS	Curriculum and Assessment Policy Statement
DBE	Department of Basic Education
FET	Further Education and Training
GFETQSF	General and Further Education and Training Qualifications Sub-framework
IEB	Independent Examinations Board
MCQ	Multiple Choice Question
NQF	National Qualifications Framework
NSC	National Senior Certificate
SACAI	South African Comprehensive Assessment Institute
SAGs	Subject Assessment Guidelines

Section 1: Overview of the Subject

The Curriculum and Assessment Policy Statement (CAPS) defines Physical Sciences as a subject that focuses on the systematic investigation of physical and chemical phenomena. It is concerned with understanding the principles that govern the natural world through scientific inquiry and with applying scientific models, theories, and laws to explain and predict phenomena in the physical environment. In alignment with national education priorities, the subject fosters an appreciation of the role of scientific knowledge in societal advancement, responsible environmental stewardship, and sustainable development.

The CAPS recognises that scientific and technological knowledge is diverse and inclusive, incorporating Indigenous Knowledge Systems (IKS) alongside conventional scientific paradigms. Indigenous knowledge, developed and transmitted across generations within communities, has contributed significantly to innovation and scientific advancement. While certain aspects of IKS can be examined and validated through the scientific method, other dimensions may not conform to conventional empirical frameworks. Nevertheless, the CAPS affirms the epistemological value of these knowledge systems in enriching learners' understanding of science and its cultural contexts.

The overarching purpose of Physical Sciences is to develop scientifically literate learners who are aware of their environment and equipped with investigative competencies required to understand physical and chemical phenomena, such as lightning or solubility. The subject develops a broad range of scientific process skills, including classification, communication, measurement, experimental design, data interpretation, hypothesis formulation, the identification and control of variables, inference, observation, comparison, prediction, problem-solving, and reflective thinking. Through the development of these competencies, learners engage in authentic scientific inquiry and acquire the capacity to construct and apply scientific and technological knowledge critically and responsibly.

Physical Sciences also promotes an understanding of the nature of science, including its methodologies, limitations, and evolving character, as well as its interrelationship with technology, society, and the environment. This integrated perspective prepares learners not only for further and specialist study in science-related fields, but also for meaningful participation in the workforce, informed citizenship, socio-economic development, and environmental management. In the South African context, the subject assumes particular significance given the increasing influence of scientific and technological innovation on economic growth and social well-being.

The Physical Sciences curriculum is organised into six principal knowledge areas: Matter and Materials; Chemical Systems; Chemical Change; Mechanics; Waves, Sound and Light; and Electricity and Magnetism. Together, these knowledge areas provide a coherent conceptual framework through which learners progressively develop both theoretical understanding and practical competence.

This report presents the findings of an evaluation of the predictability of the Physical Sciences examination papers administered by the Department of Basic Education (DBE) and the Independent Examinations Board (IEB) between 2022 and 2024. The analysis is organised according to the examinable topics prescribed in the CAPS and the IEB Subject Assessment Guidelines (SAGs). The findings are presented for each topic, highlighting patterns in assessment focus, cognitive demand, and alignment with curriculum objectives. The report also provides topic-specific recommendations for both the DBE and the IEB to strengthen assessment quality, promote balanced coverage of the curriculum, enhance alignment with the intended learning outcomes of Physical Sciences, and minimise examination predictability.

Section 2: Research Design

The study employed a qualitative research design based on document analysis to examine the predictability of DBE and IEB Physical Sciences examination papers administered between 2022 and 2024. Document analysis was considered appropriate because the study relied on pre-existing materials, enabling a subject expert to systematically examine and interpret examination papers and marking memoranda. Purposive sampling was used to select ten high-enrolment subjects offered by the DBE and IEB. The South African Comprehensive Assessment Institute (SACAI) was excluded from the study due to the close alignment of its examination guidelines with those of the DBE. Physical Sciences was selected as one of the high-enrolment subjects included in the analysis.

Data were collected by a single subject expert who analysed all relevant examination papers and marking memoranda over the three-year period using evaluation instruments grounded in the principles of content and construct validity. The conceptual framework underpinning this study is discussed in detail in the *NSC Predictability Overview Report*. The subject expert examined each examination item, compared trends across the three years, and assessed the alignment of the papers with CAPS and the Abridged CAPS topics. A structured Microsoft Word-based instrument, comprising tables and thematic questions, guided the analysis of topic coverage, item types, assessed skills and weighting, thereby enabling a comprehensive evaluation of examination predictability. The thematic questions underpinning the evaluation are discussed in detail in the *NSC Predictability Overview Report*.

Section 3: Findings from the Evaluation of the DBE and IEB Question Papers

This chapter presents the findings of the evaluation of the DBE and IEB NSC Physical Sciences examination Papers 1 and 2. The findings are based on a systematic analysis of examination papers administered between 2022 and 2024 and provide an overview of patterns relating to examination predictability.

The primary purpose of this study was to investigate whether the upward trend observed in learner performance in NSC examinations reflects genuine improvements in learner competence or whether it may, in part, be attributed to increasing levels of predictability in examination design. By analysing selected subjects across three consecutive examination cycles, the study sought to generate evidence-based insights to strengthen Umalusi's quality assurance and standardisation processes. In doing so, the study contributes to broader scholarly discourse on the validity, fairness, and integrity of high-stakes examination systems.

The findings are presented separately for the DBE and the IEB in Sections IIIA and IIIB for DBE and IEB, respectively, and for each examination paper. The analysis is organised according to the thematic questions contained in the evaluation instrument, which are discussed in detail in the research design section of the *NSC Predictability Overview Report*.

For each examinable topic, the findings are summarised in tables and accompanied by a discussion based on six themes: topic coverage, content coverage by subtopic, topic weighting, item types by subtopic, subtopic–skill pairing, and scenario–subtopic–skill pairing.

The analysis of these themes is presented in Sections a to f for each table. It evaluates the extent to which the components reflected in each table may have contributed to the predictability of the topics assessed on the Physical Sciences Paper 1 and Paper 2 examinations between 2022 and 2024.

Before presenting the findings, the six analytical themes are defined in Sections a to f below. These definitions apply to the analysis of both Paper 1 and Paper 2 across the two assessment bodies.

a. Topic coverage

The topics prescribed for examination of the National Senior Certificate (NSC) subjects are outlined in Section 4 of the CAPS or the Abridged CAPS. These guidelines help ensure alignment between the examination and the intended curriculum. The analysis of topic coverage focused on the frequency with which each topic was examined over the three years, specifically identifying any emerging patterns that may have contributed to the predictability of topic selection.

b. Content coverage

This section examined the extent to which specific content areas or subtopics within the selected topic have been assessed over three years. By analysing the frequency and repetition of subtopics in the final examination question papers, the aim was to determine whether any patterns of content selection have emerged that may contribute to the predictability of the question paper.

c. Weighting of the topic

This section explored the distribution of mark allocation or weighting assigned to the selected topic over three years. By analysing whether the marks allocated to this topic have remained consistent, increased, or decreased across examination cycles, the aim was to determine the extent to which predictable emphasis may have emerged.

d. Variation in item types

To evaluate the extent to which question design contributed to the predictability of examination papers, it was essential to examine how specific item types have been used to assess a given topic over time. This included analysing the variety of item types used (such as multiple choice questions [MCQs], essays, calculations, and practical scenarios), the distribution of marks allocated to each type, and the variation in difficulty levels and cognitive demands. Additionally, the use of command words, terms that guide the expected cognitive response, can influence question predictability. This section examined these dimensions over three years to identify patterns that may signal repetition or predictability.

e. Topic and skill pairing

To evaluate the predictability of examination question papers, it was crucial to examine how specific cognitive skills have been paired with particular topics over time. Consistent assessment of the same skills, such as interpretation, calculation, analysis, or explanation, when linked to a specific topic across multiple years, may signal a recurring pattern, potentially leading to predictability. Conversely, variation in skill pairing can help ensure a more comprehensive assessment of the intended learning outcomes. This section explored the extent to which skill demands associated with this topic have remained consistent or varied across the past three years and determined whether such patterns suggest predictability in assessment design.

f. Scenario framing of items for a topic

Some examination questions use scenarios, visual stimuli or real-life contexts to test skills within a given topic. The variety or repetition of such contexts over multiple years can influence the anticipation of question types. Consistent use of similar scenarios may contribute to predictability, whereas diverse and novel contexts encourage more profound understanding and critical thinking. This section explored how the contextual framing of questions for each topic has evolved over the past three years and sought to determine whether predictability patterns existed.

3.1: PHYSICAL SCIENCES PAPER 1

This section presents an analysis of the final examination question papers for Physical Sciences Paper 1 from 2022 to 2024. The findings for each topic are summarised in Tables 3.1.1–3.1.9.

Table 3.1.1 below summarises the analysis conducted to determine the level of predictability for the Mechanics topic on DBE Physical Sciences Paper 1 examinations from 2022 to 2024.

Table 3.1.1: Findings on the Predictability of the Mechanics Topic for the DBE Physical Sciences Paper 1 Examinations from 2022–2024

Topic: Mechanics							
Year	**Topic examined (✓) or not examined (X)**	**Content area/subtopics covered, including mark allocation**	**Overall weighting of the topic in marks**	**Item type/types (e.g., MCQ, essays, short answers, table, etc.) and marks allocated per content area/subtopic**	**Level of difficulty per item type used to examine the subtopic**	**Cognitive level per item type used to examine the subtopic**	**Skill assessed per subtopic**

2022	✓	Newton's Laws and Application of Newton's Laws **21 marks**	**68 marks**	MCQ = 8 Short answer = 2 Drawings = 4 Calculation = 7	L1, L2, L3 L2 L3 L3	L1, L2, L3 L1 L3 L3	Calculation Drawing diagram
	✓	Momentum and impulse **14 marks**		Short answer = 2 Calculate = 12	L2 L2	L1 L3	Recall Calculation
	✓	Vertical Projectile Motion **18 marks**		MCQ = 2 Short answer = 2 Calculate = 14	L2 L1 L2, L3	L2 L1 L3	Recall Calculation Drawing
	✓	Work, Energy and Power **15 marks**		Short answer = 2 Calculation= 13	L2 L3	L1 L3	Recall Calculation
2023	✓	Newton's Laws and Application of Newton's Laws **18 marks**	**65 marks**	MCQs=2 Short answer=2 Drawing=4 Calculation=7 Explanation=3	L1 L2 L3 L3 L3	L1 L1 L3 L3 L3	Recall Drawing Calculation Interpretation Deduction

	✓	Momentum and impulse **13 marks**		MCQs=2 Short answer=3 Calculation=8	L3 L2 L3	L3 L1 L3	Recall Calculation
	✓	Vertical Projectile Motion 18 marks		MCQs=2 Short answer=2 Calculation=11 Graph interpretation=3	L3 L2 L3 L3	L3 L1 L3 L3	Recall Drawing Calculation Interpretation Deduction
	✓	Work, Energy and Power 16 marks		MCQs=4 Short answer=3 Drawing=3 Calculation=6	L2, L2 L2, L2 L3	L2, L3 L2, L3 L3 L3	Recall Drawing Calculation Interpretation
2024	✓	Newton's Laws and Application of Newton's Laws 17 marks	65	MCQs=2 Short answer=2 Drawing=2 Calculation=9 Explanation=2	L2 L2 L3 L3 L2	L2 L1 L3 L3 L2	Recall Drawing Calculation Graph interpretation
	✓	Momentum and impulse 16 marks		MCQs=4 Short answer=3 Calculation=9	L2, L3 L2 L3	L3, L3 L1 L3	Recall Calculation Interpretation

	✓	Vertical Projectile Motion 18 marks		MCQs=2 Drawing=4 Calculation=12	L2 L3 L3	L2 L3 L4, L3	Drawing Calculation Interpretation
	✓	Work, Energy and Power 14 marks		MCQs=2 Short answer=2 Drawing=4 Calculation=4 Explanation=2	L2 L2 L3 L3 L2	L2 L1 L3 L3 L2	Recall Drawing Calculation Interpretation

Table 3.1.1 presents a comparative overview of the Mechanics topic across the three-year period. The analysis, presented in sections a to f, evaluates whether the components reflected in Table 3.1.1 have contributed to the predictability of the DBE Physical Sciences final examination question Paper 1 from 2022 to 2024.

a. Topic coverage

The findings indicate that the topics in Mechanics appeared consistently across the three consecutive NSC examination question papers (2022–2024). The Physical Sciences Examination Guidelines (2021) indicate that Mechanics should be covered and examined. This directive aligns with the CAPS, which includes Mechanics as one of the content topics to be examined in the Grade 12 examination. The frequency of the topic's appearance across the three-year period shows a predictable pattern in coverage. This predictability is necessary and largely acceptable, as it shows that the examination question papers are aligned with the assessment prescripts.

It has also been observed that a total of ten questions were set in each examination question paper over the past three years (2022–2024). An interesting factor was noted: the Mechanics appeared as Questions 2, 3, 4, and 5 in all the examination question papers. The appearance of the topic in a known question number may constitute an element of predictability. The CAPS and the Examination Guidelines do not stipulate how the questions should be structured. This predictability is largely acceptable, as it does not provide any hints about the item types. Rather, it emphasises what candidates should expect in an examination question paper.

b. Content coverage

The findings suggest that the intended content was covered in all three past years (2022–2024). There are four content topics in Mechanics (Newton's Laws and Application of Newton's Laws; Momentum and Impulse; Vertical Projectile Motion; and Work, Energy and Power). An observation indicates that all subtopics were satisfactorily covered. This means that the curriculum was adequately represented. The evaluator further noticed that the format and phrasing of the questions varied over the past three years. The consistent appearance of the subtopics across the years may be regarded as an element of predictability. This is acceptable in the sense that the assessed core content is mandated by the prescripts for inclusion on an annual basis.

c. Weighting of the topic

The analysis reveals minimal differences in the mark allocation for certain subtopics, as shown in Table 3.1.2.

Table 3.1.2: The Distribution of Marks per Subtopic in the Different Years

SUBTOPIC	2022 ALLOCATED MARKS	2023 ALLOCATED MARKS	2024 ALLOCATED MARKS
Newton's Laws and Application of Newton's Laws	21	18	17
Momentum and impulse	14	13	16
Vertical Projectile Motion	18	18	18
Work, Energy and Power	15	16	14

In general, there is evidence that the marks were distributed proportionally across the subtopics over the three years. No subtopic was dominant when it comes to the proportionality of the marks. This distribution of marks constitutes an acceptable predictability.

d. Variation in item types

The evaluation indicates that various question types were used over the three-year period. They include MCQs, short-answer questions, calculations, explanations, diagram drawing, and sketch interpretation. It was further observed that the question format varied over the past three years. The continued frequency of the item types may lead to predictability. However, this can be considered acceptable predictability because the phrasing of the questions was never repeated.

Structured questions on calculations, drawing, and the interpretation of graphs were consistently repeated over the three-year period, but the manner of questioning was different. This could be true that the examiners were adhering to the curriculum alignment. Furthermore, there was evidence of content and construct validity, which emphasised that the examination questions followed the standards of the prescriptions. Although there was a repetition of the format and the pattern of examination questions, this is regarded as acceptable predictability, as the question papers were aligned with the assessment prescripts.

It was found that the difficult questions (Level 3) appeared in all three years (2022–2024). The phrasing of the questions was not similar throughout the three years. In other words, different cohorts of learners were asked different questions but of the same standard and level. Consequently, there was greater variation in the question format. Although the consistency of the above item types is predictable, it should be noted that this is acceptable given the broader variation in item types.

e. Topic and skill pairing

The findings provide evidence that a variety of skills were used across different topics over the past three years.

The following skills were employed:

- Recall
- Drawing
- Calculation
- Interpretation
- Deduction
- Theoretical explanation

Almost all the skills were employed across the subtopics but were never used to assess the same topic. In this case, the frequency of the skills constitutes an acceptable level of predictability.

f. Scenario framing of items for a topic

The patterns observed show that diverse scenarios were used, which prevented memorisation and encouraged critical thinking. A good example is Question 3, which deals with Vertical Projectile Motion.

The following scenarios were used:

2022: Question 3

- A ball was thrown vertically upwards from the top of the building.

2024: Question 3

- A ball of mass 0,5kg is thrown vertically upwards from the top edge of a building.

2024: Question 3

- A ball was thrown vertically upwards and two seconds later a second ball was thrown vertically downwards.

The above scenarios suggest that the same topic was not repeated in the past three years. This emphasises the validity of the question paper. Different cohorts could predict that the question paper would consist of scenarios. When the framing scenarios of questions vary, the predictability of the question paper is acceptable.

Table 3.1.3 below summarises the analysis conducted to determine the level of predictability for the Waves, Sound and Light topic on DBE Physical Sciences Paper 1 examinations from 2022 to 2024.

Table 3.1.3: Findings on the Predictability of the Waves, Sound and Light for the DBE Physical Sciences Paper 1 Examinations from 2022–2024

Topic: Waves, Sound and Light							
Year	**Topic examined (✓) or not examined (X)**	**Content area/subtopics covered, including mark allocation**	**Overall weighting of the topic in marks**	**Item type/types (e.g., MCQ, essays, short answers, table, etc.) and marks allocated per content area/subtopic**	**Level of difficulty per item type used to examine the subtopic**	**Cognitive level per item type used to examine the subtopic**	**Skill assessed per subtopic**
2022	✓	Doppler Effect 12 marks	**12**	MCQ=2 Short answer=5 Calculation=5	L2 L1, L3 L3	L2 L1, L2, L3 L3	Draw graph Interpretation of graph Calculation
2023	✓	Doppler Effect 15 marks	**15**	MCQ=2 Short answer=8 Calculation=5	L1 L1, L2 L3	L1, L2 L2 L3	Calculation Deducing the results

2024	✓	Doppler Effect 14 marks	**14**	MQC=2 Short answer=3 Calculation=9	L2 L1, L2, L3 L2, L3	L2 L1, L2 L2, L3	Calculation Diagram interpretation

Table 3.1.3 presents a comparative overview of the Waves, Sound and Light topic across the three-year period. The analysis, presented in sections a to f, evaluates whether the components reflected in Table 3.1.3 have contributed to the predictability of the DBE Physical Sciences final examination question Paper 1 from 2022 to 2024.

a. Topic coverage

The findings indicate that the Doppler Effect appeared consistently across all three consecutive NSC examination question papers (2022–2024). The 2021 Physical Sciences Examination Guidelines indicate that Doppler Effect should be covered and examined. This directive aligns with the CAPS, which includes the Doppler Effect as one of the content topics to be examined in the Grade 12 examination. The frequency of the topic's appearance across the three-year period shows a predictable pattern in coverage. This predictability is necessary and largely acceptable, as it shows that the examination question papers are aligned with the assessment prescripts.

It has also been observed that a total of ten questions were set in each examination question paper over the past three years (2022–2024). An interesting factor was noted: the Doppler Effect appeared as Question 6 in all the examination question papers. The appearance of the topic in a known question number may constitute an element of predictability. The CAPS and the Examination Guidelines do not stipulate how the questions should be structured. This predictability is largely acceptable, as it does not provide any hints about the item types. Rather, it emphasises what candidates should expect in an examination question paper.

b. Content coverage

The findings suggest that the Doppler Effect was examined consecutively in the NSC examination over a three-year period (2022–2024). The successive appearance of the content topic could be attributed to the CAPS prescript and the Examination Guidelines. Any omission of this content topic in a particular year could be tantamount to a deviation from the policy imperative and be regarded as non-compliance. Consequently, the frequency of occurrence of the Doppler Effect could be considered predictable. However, this is acceptable predictability given that it adheres to the assessment prescripts.

It has been noted that although the content topic appeared frequently across the three years (2022–2024), the question patterns differ. Below is the way the questions were asked:

2022: Question 6

- An investigative question was asked. A graph of fL and fs was shown in the examination question paper.

2023: Question 6

- A scenario on the sound source and the listener was presented. No graph or table was provided.

2024: Question 6

- A scenario involving a sound source and a listener was presented. It was accompanied by a graph of wavelength vs time.

In all the above questions, the content topic was repeated, but the questions continued to vary. This repetition demonstrates acceptable predictability, as it shows alignment between the examination questions and the prescripts.

c. Weighting of the topic

The analysis reveals a slight deviation in the mark allocation between the examination question papers and the assessment prescripts, as shown in Table 3.1.4.

Table 3.1.4: Findings on CAPS Weighted Prescribed Topics Against the Raw Marks in the Question Papers

YEAR	PAPER	CAPS	QUESTION PAPER
2022	1	15	12 (8%)
2023	1	15	15 (10%)
2024	1	15	14 (9,3%)

According to Table 3.1.4, the 2023 examination question paper complied exactly with the assessment prescripts. Table 3.1.4 shows that there was no consistency in the weighting for this topic. The percentages indicate that the deviation in weighting is slightly. This could suggest that the examination topic's weighting is predictable. Nevertheless, such predictability is acceptable because it complies with the assessment prescripts.

Furthermore, the slight deviation ensures that learners across different cohorts respond to questions of the same weight. When this happens, the examination question papers of the three years become comparable. This practice of setting the question papers should be maintained. Only the slight deviation in mark allocation must be corrected in the future.

d. Variation in item types

The evaluation indicates that the same content topic was set using different item types over a three-year period.

The following item types were identified:

2022: Question 6

- MCQ
- Short answer questions
- Graph interpretation and drawing (graph of FL vs fs)
- Calculation
- Theoretical explanation

2023: Question 6

- MCQ
- Short answer questions
- Making deductions
- Calculation
- Theoretical explanation

2024: Question 6

- MCQ
- Short answer questions
- Graph interpretation (wavelength vs time)
- Calculation
- Theoretical explanation

It has been observed that the MCQ appeared consistently in all the question papers over a three-year period. These MCQs were always asked as Question 1.6. This pattern could introduce a degree of predictability, as candidates would know in advance where the Doppler Effect would appear in MCQs. However, this can be considered acceptable predictability because the phrasing of the questions was never repeated.

Structured questions on calculations, drawing, and the interpretation of graphs were consistently repeated over the three-year period, but the manner of questioning varied. This could be because the examiners were adhering to the curriculum alignment. Furthermore, there was evidence of content and construct validity, which emphasised that the examination questions followed the standards of the prescriptions. Although there was a repetition of the format and the pattern of examination questions, this is regarded as acceptable predictability, as the question papers were aligned with the assessment prescripts.

It was found that the difficult questions (Level 3) appeared in all three years (2022–2024). The phrasing of the questions was not similar throughout the three years. In other words, different cohorts of learners were asked different questions but of the same standard and level. Consequently, there was greater variation in the question format. Although the consistency of the above item types is predictable, it should be noted that this is acceptable given the broader variation in item types.

e. Topic and skill pairing

The findings provide evidence that the following skills have been used to assess each subtopic of Doppler Effect over the three-year period:

- Interpretation
- Calculation

- Analysis
- Explanation
- Recall

In the years 2022 and 2024, graphs were included in the question papers for the candidate to interpret, analyse, and use for calculations. There was no graph in the 2023 question paper. Another interesting factor was that the graphs in the two comparative years (2022 and 2024) were based on different concepts. In the 2024 question paper, an explanation was asked about the phenomenon, while in the 2023 and 2024 question papers, questions asked whether the movement was towards or away. An observation shows that skill pairing per topic has varied across the three years (2022–2024). Therefore, it can be concluded that since the same topic was not always paired with the same skill, the examination question paper may lead to acceptable predictability.

f. Scenario framing of items for a topic

The patterns observed show that diverse scenarios were used, which prevented memorisation and encouraged critical thinking.

The following scenarios were used:

2022: Question 6

- A learner investigates the relationship between the observed frequency and the frequency of sound waves emitted by a stationary source.

2023: Question 6

- An ambulance is moving away from a stationary listener at a constant velocity of 25m.s^{-2} . The ambulance siren emits sound waves at a frequency of 550Hz. The listener detects the frequency of these waves to be 512,64 Hz.

2024: Question 6

- A stationary listener, standing on the roadside, records the wavelength of the sound emitted by the siren of a police car travelling at a constant velocity.

The above scenarios suggest that the same topic was not repeated in the past three years. This emphasises the validity of the question paper. Different cohorts could predict that the question paper would consist of scenarios. When the framing scenarios of questions vary, the predictability of the question paper is acceptable.

Table 3.1.5 below summarises the analysis conducted to determine the level of predictability for the Electricity and Magnetism topic in DBE Physical Sciences Paper 1 examinations from 2022 to 2024.

Table 3.1.5: Findings on the Predictability of the Electricity and Magnetism Topic for the DBE Physical Sciences Paper 1 Examinations from 2022–2024

Topic: Electricity and Magnetism							
Year	**Topic examined (✓) or not examined (X)**	**Content area/subtopics covered, including mark allocation**	**Overall weighting of the topic in marks**	**Item type/types (e.g., MCQ, essays, short answers, table, etc.) and marks**	**Level of difficulty per item type used to examine the subtopic**	**Cognitive level per item type used to examine the subtopic**	**Skill assessed per subtopic**

				allocated per content area/subtopic			
2022	✓	Electrostatics (19)	54	MCQ=2 Short answers=5 Draw=2 Calculation=10	L2 L2 L2 L4	L2 L1, L2 L2 L3	Recall Drawing calculation
	✓	Electric Circuits (22)		MCQ=2 Short answers=9 Calculation=7 Explanation=4	L2 L2 L3 L3	L2 L1, L3 L3 L2	Recall Analysis Drawing Calculation Theoretical explanation
	✓	Electrodynamics (13)		MCQ=2 Short answers=3 Calculation=4 Sketch graph=4	L3 L1, l2 L2 L2	L3 L1, L2 L3 L3	Recall Drawing Calculation
2023	✓	Electrostatics (15)	51	MCQ=2 Short answers=2 Drawing=3	L2 L2 L2	L2 L1 L3	Recall Drawing Calculation

				Calculation=8	L3	L3	Interpretation Deduction
	✓	Electric Circuits (20)		MCQ=2 Short answers=2 Calculation=12 Explanation=4	L3 L2 L3 L3	L3 L1 L3 L2	Recall Calculation Theoretical explanation
	✓	Electrodynamics (16)		MCQ=2 Short answers=8 Calculation=6	L2 L1, l2 L2	L1 L1 L3	Recall Drawing Calculation
2024	✓	Electrostatics (16)	54	MCQ=2 Short answers=3 Drawing=3 Calculation=8	L2 L2 L2 L3	L3 L1 L3 L3	Recall Drawing Calculation
	✓	Electric Circuits (23)		MCQ=2 Short answers=2	L1 L3	L1 L1	Recall Drawing

			Calculation=19	L3	L3	Calculation Interpretation Deduction
	✓	Electrodynamics (15)	MCQ=2 Short answers=6 Calculation=5 Description=2	L1 L1 L2 L2	L1 L1 L3 L2	Description Recall Calculation Interpretation

Table 3.1.1 presents a comparative overview of the Electricity and Magnetism topic across the three-year period. The analysis, presented in sections a to f, evaluates whether the components reflected in Table 3.1.1 have contributed to the predictability of the DBE Physical Sciences final examination question Paper 1 from 2022 to 2024.

a. Topic coverage

The findings indicate that the topic of Electricity and Magnetism appeared consistently across all three successive NSC examination question papers (2022–2024). The 2021 Physical Sciences Examination Guidelines indicate that Electricity and Magnetism should be covered and examined. This directive aligns with the CAPS, which includes Electricity and Magnetism as one of the content topics to be examined in the Grade 12 examination. The frequency of the topic's appearance across the three-year period shows a predictable pattern in coverage. This predictability is necessary and largely acceptable, as it shows that the examination question papers are aligned with the assessment prescripts.

b. Content coverage

The findings suggest that Electricity and Magnetism was examined consecutively in the NSC examination over a three-year period (2022–2024). The consistent appearance of the content topic could be attributed to the CAPS prescript and the Examination Guidelines. Any omission of this content topic in a particular year could be tantamount to a deviation from the policy imperative and be regarded as non-compliance. Consequently, the frequency of appearance of Electricity and Magnetism could be considered as predictable. However, this is acceptable predictability given that it adheres to the assessment prescripts.

Both the CAPS and the Abridged CAPS show that the following subtopics must be examined on an annual basis:

- Electrostatics
- Electric circuits
- Electrodynamics

The reference to the 2024–2024 examination question papers indicated that all three subtopics were covered.

c. Weighting of the topic

The analysis reveals that there was an insignificant difference in mark allocation per subtopic over a three-year period, as shown in Table 3.1.6.

Table 3.1.6: The Distribution of Marks per Subtopic in the Different Years

SUBTOPIC	2022 ALLOCATED MARKS	2023 ALLOCATED MARKS	2024 ALLOCATED MARKS
Electrostatics	19	15	16

Electric Circuit	22	20	23
Electrodynamics	13	16	15
Totals	54	51	54

Table 3.1.6. illustrates that in 2022, the topic of Electricity and Magnetism was allocated a total of 54 marks. Similar trends were observed in 2024, with a total of 54 marks, while 2023 registered 51 marks. In other words, there was a slight decrease in mark allocation from 2022 to 2023, followed by a slight increase from 2023 to 2024. This low margin of increase and decrease may constitute a predictability. A conclusion could be drawn that the mark allocation was distributed proportionally across the subtopics over the three years. The variance in mark allocation has been consistent, resulting in acceptable predictability.

d. Variation in item types

The evaluation indicates that various question types were used over the three-year period. They include MCQs, short-answer questions, calculations, explanations, diagram drawing, and sketch interpretation. It was further discovered that the question format varied over the past three years. The continued frequency of the item types may lead to predictability. However, this can be considered acceptable predictability because the phrasing of the questions was never repeated.

Structured questions on calculations and the drawing of the resultant electric field pattern were consistently repeated over the three-year period, but the manner of questioning varied. It could be that the examiners were adhering to the curriculum alignment. Furthermore, there was evidence of content and construct validity, which emphasised that the examination questions followed the standards of the prescriptions. Although there was a repetition of the format and the pattern of examination questions, this is regarded as acceptable predictability, as the question papers were aligned with the assessment prescripts.

It was found that the difficult questions (Level 3) appeared in all three years (2022 -2024). The phrasing of the questions was not similar throughout the three years. In other words, different cohorts of learners were asked different questions but of the same standard and level. Consequently, there was greater variation in the question format. Although the consistency of the above item types is predictable, it should be noted that this is acceptable given the broader variation in item types.

e. Topic and skill pairing

The findings provide evidence that the following skills have been used to assess each subtopic of Electricity and Magnetism over the three-year period:

- Calculation
- Analysis
- Interpretation
- Making deduction
- Explanation
- Recall

In the years 2022 and 2024, graphs were included in the question papers for the candidate to interpret, analyse, and use for calculations. There was no graph in the 2023 question paper. Another interesting factor was that the graphs in the two comparative years (2022 and 2024) were based on different concepts. In the 2024 question paper, an explanation was asked about the phenomenon, while in the 2023 and 2024 question papers, questions asked whether the movement was towards or away. An observation shows that skill pairing per topic has varied across the three years (2022–2024). Therefore, it can be concluded that since the same topic was not always paired with the same skill, the examination question paper may lead to acceptable predictability.

f. Scenario framing of items for a topic

The patterns observed show that diverse scenarios were used, which prevented memorisation and encouraged critical thinking. A good example is Question 3, which deals with Vertical Projectile Motion.

The following scenarios were used:

2022–2024: Question 7

- In this question, candidates were examined on Electrostatics. The 2022 question paper discusses a charged sphere M, whereas the 2023 question paper introduces two point charges A and B. The 2024 question was based on P as a point charge.

2022–2024: Question 8

- All the question papers presented the circuit diagrams which were labelled differently. The question papers had different formats, even though they tested the same subtopic.

The above scenarios suggest that the same topic was not repeated in the past three years. This emphasises the validity of the question paper. Different cohorts could predict that the question paper would consist of scenarios. When the framing scenarios of questions vary, the predictability of the question paper is acceptable.

Table 3.1.7 below summarises the analysis conducted to determine the level of predictability for the Matter and Materials topic in DBE Physical Sciences Paper 1 examinations from 2022 to 2024.

Table 3.1.7: Findings on the Predictability of the Matter and Materials Topic for the DBE Physical Sciences Paper 1 Examinations from 2022–2024

Topic: Matter and Materials							
Year	**Topic examined (✓) or not examined (X)**	**Content area/subtopics covered, including mark allocation**	**Overall weighting of the topic in marks**	**Item type/types (e.g., MCQ, essays, short answers, table, etc.) and marks allocated per content area/subtopic**	**Level of difficulty per item type used to examine the subtopic**	**Cognitive level per item type used to examine the subtopic**	**Skill assessed per subtopic**
2022	✓	Optical Phenomena and Properties of Materials (16)	**16**	MCQ=2 Short answer=6 Calculation=8	L2 L1, L2 L3	L2 L1, L2 L3	Calculation. Deduce the results
2023	✓	Optical Phenomena and Properties of Materials (19)	**19**	MCQ=2 Short answer=7 Calculation=10	L2 L1, L2 L3	L2 L1, L2 L4	Calculation Description of phenomena Identifying the results

2024	✓	Optical Phenomena and Properties of Materials (17)	**17**	MCQ=2 Short answer=10 Calculation=5	L2 L1, L2 L3	L2 L1, L2 L3	Deduce experimental results Calculation Description

Table 3.1.1 presents a comparative overview of the Matter and Materials topic across the three-year period. The analysis, presented in sections a to f, evaluates whether the components reflected in Table 3.1.1 have contributed to the predictability of the DBE Physical Sciences final examination question Paper 1 from 2022 to 2024.

a. Topic coverage

The findings indicate that the topic of Optical Phenomena and Properties of Materials appeared consistently across all three successive NSC examination question papers (2022–2024). The 2021 Physical Sciences Examination Guidelines indicate that Optical Phenomena and Properties of Materials should be covered and examined. This directive aligns with the CAPS, which includes Optical Phenomena and Properties of Materials as one of the content topics to be examined in the Grade 12 examination. The frequency of the topic's appearance across the three-year period shows a predictable pattern in coverage. This predictability is necessary and largely acceptable, as it shows that the examination question papers are aligned with the CAPS and the Examination Guidelines.

It has also been observed that a total of ten questions were set in each examination question paper over the past three years (2022–2024). An interesting factor was noted: Optical Phenomena and Properties of Materials appeared as Question 10 in all the examination question papers. The appearance of the topic in a known question number may constitute an element of predictability. The CAPS and the Examination Guidelines do not stipulate how the questions should be structured. This predictability is acceptable,

as it does not provide any hints about the item types. Rather, it emphasises what candidates should expect in an examination question paper.

b. Content coverage

The findings suggest that Optical Phenomena and Properties of Materials were examined consecutively in the NSC examination over a three-year period (2022–2024). The consistent appearance of the content topic could be attributed to the CAPS prescript and the Examination Guidelines. Any omission of this content topic in a particular year could be tantamount to a deviation from the policy imperative and be regarded as non-compliance. Consequently, the frequency of appearance of Optical Phenomena and Properties of Materials could be considered as predictable. However, this is acceptable predictability given that it adheres to the CAPS requirements.

c. Weighting of the topic

The analysis reveals a slight difference in the marks allocated to Optical Phenomena and Properties of Materials over a three-year period, as shown in Table 3.1.8.

Table 3.1.8: The CAPS Weighted Prescribed Topics Against the Raw Marks in the Question Papers over Three Years

YEAR	PAPER	CAPS	QUESTION PAPER
2022	1	15	16 (10,7%)
2023	1	15	19 (12,7%)
2024	1	15	17 (11,3%)

According to Table 3.1.8, there was an increase in the distribution of marks across the topic over the three years. This could suggest that the examination topic's weighting is predictable. Nevertheless, such predictability is acceptable given that the marks are distributed proportionally across the topic, which ultimately discourages patterned learning strategies. Furthermore, the slight deviation ensures that learners across different cohorts are made to respond to questions of the same weight. When this happens, the examination question papers of the three years become comparable. This practice of setting the question papers should be maintained.

d. Variation in item types

The evaluation indicates that the topic, "Optical Phenomena and Properties of Materials" was set using different item types over a three-year period.

The following item types were identified:

2022: Question 10

- MCQ
- Short answer questions
- Making deductions
- Calculation

2023: Question 10

- MCQ
- Short answer questions

- Calculation
- Theoretical explanation

2024: Question 10

- MCQ
- Short answer questions
- Graph interpretation (wavelength vs time)
- Calculation
- Theoretical explanation

It has been observed that the MCQ appeared consistently in all the question papers over a three-year period. These MCQs were always asked as Question 1.10. This pattern could introduce a degree of predictability, as candidates would know in advance the placement of Optical Phenomena and Properties of Materials in MCQs. However, this can be considered acceptable predictability because the phrasing of the questions was never repeated. It is therefore recommended that future examination questions should avoid the situation whereby the MCQ on Optical Phenomena and Properties of Materials is placed on item 1.10.

Structured questions were consistently repeated over the three-year period, but the manner of questioning varied. This could be true that the examiners were adhering to the curriculum alignment. Furthermore, there was evidence of content and construct validity, which emphasised that the examination questions followed the standards of the prescriptions. Although there was a repetition of the format and the pattern of examination questions, this is regarded as acceptable predictability, as the question papers were aligned with the assessment prescripts.

It was found that the difficult questions (Level 3) appeared in all three years (2022–2024). The phrasing of the questions was not similar throughout the three years. In other words, different cohorts of learners were asked different questions but of the same standard and level. Consequently, there was greater variation in the question format. Although the consistency of the above item types is predictable, it should be noted that this is acceptable given the broader variation in item types.

It was also observed that the levels of cognitive demand (L1–L4) were represented in 2022 and 2023, whereas in 2024 they were L1–L3. This emphasises the comparability of the question papers over the three years. No cohort was favoured in any of the years. The consistent distribution of cognitive demand levels in the topic could be regarded as predictable. The reference to the cognitive demand levels indicates a combination of low- and high-order thinking. This could be translated into acceptable predictability, as there is no recurrence of the low-order questions alone.

e. Topic and skill pairing

The findings provide evidence that the following skills have been used to assess each subtopic of Optical Phenomena and Properties of Materials over the three-year period:

- Interpretation
- Calculation
- Explanation
- Recall

Different drawings appeared in the question papers of all three years. The candidate was expected to interpret and use them for calculations. In the 2022 question paper, the candidates were required to interpret the effect of a light incident on a cathode. In the

2023 question paper, candidates were required to interpret the effect of the work function when two charges are separated on a table. On the other hand, the 2024 question paper required candidates to interpret the effects of different lighting conditions on a sheet. Furthermore, the candidates were also expected to perform calculations based on the given information and data. Therefore, it can be concluded that, because the same topic was not always paired with the same skill, the examination question paper may not yield predictable questions.

Questions that required candidates to calculate had a mark allocation of 4–6. This is a slight difference that could mean that different cohorts were examined on questions with the same cognitive demands.

It was further observed that all the question papers (2022–2024) comprised difficult questions (Level 3).

f. Scenario framing of items for a topic

The patterns observed show that diverse scenarios were used, which discourage memorisation and encourage critical thinking.

The following scenarios were used:

2022: Question 10

- Light is incident on the cathode of a photoelectric cell connected to a battery and a sensitive ammeter, as shown below:

2023: Question 10

- Two small spheres, A and B, made of pure zinc, are at rest 0,1 m apart on a wooden table. Sphere A is negatively charged and is free to move on the table, while sphere B is uncharged and fixed to the table, as shown in the diagram below:

2024: Question 10

Red, blue, and green light are shone simultaneously onto a sheet of potassium, as shown in the diagram below:

The above scenarios suggest that the same topic was not repeated in the past three years. This emphasises the validity of the question paper. Different cohorts could predict that the question paper would consist of scenarios. When the framing scenarios of questions vary, the predictability of the question paper is acceptable.

Summary of findings and recommendations for the DBE Physical Sciences Paper 1

Table 3.1.9 below summarises identified patterns of predictability across key components of question paper design, along with corresponding recommendations to reduce predictability and strategies to maintain effective assessment practices without compromising variability.

Table 3.1.9: Summary of Findings and Recommendations on the Predictability of the 2022–2024 DBE Physical Sciences Paper (1)

Identified unacceptable predictability on topic coverage
The evaluator found that the 2022–2024 examination question papers were fully aligned with the assessment prescripts. When the question papers align with the assessment prescripts, that translates into acceptable predictability. Consequently, no unacceptable predictability in topic coverage was identified.
Recommendations to avoid unacceptable predictability on topic coverage
The prescribed topics (Mechanics, Waves, Sound and Light, Electricity and Magnetism, Optical Phenomena and Properties of the Materials) should be maintained.

When setting an examination question paper, include all the subtopics.
Identified unacceptable predictability on content coverage
All the subtopics were covered, ensuring that the curriculum was adequately represented. The format and phrasing of the questions were varied. Therefore, there was no element of unacceptable predictability.
Recommendations to avoid predictable content coverage
Maintain the successive appearance of the content topics; they are aligned to the prescripts.
Strategies to maintain content coverage that do not lead to a predictable question paper
The setting of examination question papers should align with the prescripts. Adding or removing new content should be avoided.
Identified unacceptable predictability on topic weighting
A low, consistent variance was observed in the weighted topics annually. Mark allocation of topics in the past three years was comparable. There was no identified unacceptable predictability.
Recommendations to avoid unacceptable predictability on topic weighting
Mark allocation should be maintained on topic weighting. Adherence to the stipulations in the relevant prescripts is critical. Disproportionate weighting must be discouraged. It is important to maintain a balance of easy, moderately difficult, difficult, and very difficult questions.
Strategies to maintain topic weighting that do not lead to a predictable question paper
Continuous reference to the assessment prescripts. Evidence that marks are distributed proportionally across topics over the years.

Identified unacceptable predictability on item types
There has been a selection of question types (MCQ, short answer, explanation, calculations, drawing, investigative, recall) over the past three years (2022–2024). There was greater variation in the question formats across the specified curriculum topics. Therefore, no unacceptable predictability was identified across item types.
Recommendations to avoid unacceptable predictability on item types
Various categories of questions; MCQ, drawing of diagrams, explanation, calculation, naming of concepts, stating/defining, drawing of tables and graphs should be maintained. Repetition of format and pattern of questions to be maintained for preserving standard except where questions are repeated.
Strategies to maintain the assessment of item types that do not lead to a predictable question paper
To have access to previous examination question papers when setting a new question paper. An expanded variation in item types can lead to acceptable patterns.
Identified unacceptable predictability on topic–skill pairing
Different skills were used to assess the same topic. Predominant skills assessed: analysis, calculations, drawings, explanations, deducing, and recall. No element of unacceptable predictability was found.
Recommendations to avoid unacceptable predictability through topic–skill pairing
When assessing the topics, avoid using the same skills on the same topic. The application of different skills to achieve the intended learning outcomes on the topics should be continued.
Strategies to maintain topic–skill pairing that do not lead to a predictable question paper
Select questions that will allow the use of different skills rather than focusing on the same ones.

Level 3 cognitive demand questions (Application and Analysis) may contain various skills.
Identified unacceptable predictability in the scenario framing of items
Neither the language used nor the context of the questions in the intended curriculum were repeated. The pattern observed shows that diverse scenarios were used, which averted memorisation and encouraged critical thinking. Consequently, there was no identifiable element of unacceptable predictability.
Recommendations to avoid unacceptable predictability in scenario framing of items
Ensure that the context of questions on the same topic is not repeated. Employ a variety of scenarios to prevent rote memorisation and encourage critical thinking.
Strategies to maintain scenario framing of items that do not lead to a predictable question paper
Questions that contain acceptable stimuli should be sustained. When using graphs or diagrammatic representations, alter the variables and similar graphs or diagrams.

Conclusions

The evaluator found that the examination question papers for the past three NSCs were of acceptable predictive value. There was no repetition of items in the 2022, 2023, and 2024 NSC examination questions, except when the assessed curriculum was aligned with the prescripts. The format and structure of the examination questions have been maintained, including the total mark allocation, the total number of questions, including MCQs, and the location of topics within the question papers. Various item types were employed, ensuring the assessment standards were valid. The use of selective scientific skills on the same topics also ensured acceptable predictability.

3.2: PHYSICAL SCIENCES PAPER 2

This section presents an analysis of the DBE final examination question papers for the Physical Sciences Paper 2 topics from 2022 to 2024. The findings for each topic are summarised in Tables 3.2.1–3.2.6.

Table 3.2.1 below summarises the analysis conducted to determine the level of predictability for the Matter and Materials topic in DBE Physical Sciences Paper 2 examinations from 2022 to 2024.

Table 3.2.1: Findings on the Predictability of the Matter and Materials Topic for the DBE Physical Sciences Paper 2 Examinations from 2022–2024

Topic: MATTER AND MATERIALS							
Year	**Topic examined (✓) or not examined (X)**	**Content area/subtopics covered, including mark allocation**	**Overall weighting of the topic in marks**	**Item type/types (e.g., MCQ, essays, short answers, table, etc.) and marks allocated per content area/subtopic**	**Level of difficulty per item type used to examine the subtopic**	**Cognitive level per item type used to examine the subtopic**	**Skill assessed per subtopic**
2022	✓	Organic Molecules	50 marks	MCQ = 6 Short answer = 38 Drawings = 2	L1, L2 L2, L3 L2	L1, L2 L1, L2, L3 L3	Recall Analysis

		50 marks		Explanation = 4	L3	L2	Theoretical explanation Drawing
2023	✓	Organic Molecules 56 marks	56 marks	MCQs=6 Short answer=37 Drawing=9 Explanation=4	L2 L1, L2,3 L3 L3	L2, L3 L1, L2,L3 L3 L2	Recall Analysis Theoretical explanation Identification and question phenomena Drawing Investigation
2024	✓	Organic Molecules 57 marks	57 marks	MCQs=6 Short answer=31 Drawing=13 Explanation=7	L2 L1, L2, L3 L2 L2	L2, L3 L1, L2, L3, L4 L2 L2, L3	Recall Theoretical explanation Analysis Drawing

Table 3.2.1 presents a comparative overview of the Matter and Materials topic across the three-year period. The analysis, presented in sections a to f, evaluates whether the components reflected in Table 3.2.1 have contributed to the predictability of the DBE Physical Sciences final examination question Paper 2 from 2022 to 2024.

a. Topic coverage

The findings indicate that the topic of Organic Molecules appeared consistently across all three consecutive NSC examination question papers (2022–2024). The 2021 Physical Sciences Examination Guidelines indicate that Organic Molecules should be covered and examined. This directive aligns with the CAPS, which includes Organic Molecules as one of the content topics to be examined in the Grade 12 examination. The frequency of the topic's appearance across the three-year period shows a predictable pattern in coverage. This predictability is necessary and largely acceptable, as it demonstrates that the examination question papers align with the CAPS and the Examination Guidelines.

It has also been observed that a total of nine questions were set in each examination question paper over the past three years (2022–2024). An interesting factor was noted: the Organic Molecules appeared as Questions 2, 3, and 4 in all the examination question papers. The appearance of the topic in a known question number may constitute an element of predictability. The CAPS and the Examination Guidelines do not stipulate how the questions should be structured. This predictability is largely acceptable, as it does not provide any guidance on item types. Rather, it emphasises what candidates should expect in an examination question paper.

The evaluator further noted that certain concepts are asked repeatedly.

Table 3.2.2: The Terms Asked in Successive Years

QUESTION ASKED	YES/NO IN 2022	YES/NO IN 2023	YES/NO IN 2024
Define the term vapour pressure	Yes		Yes
Define cracking	Yes	Yes	Yes

b. Content coverage

The findings suggest that the Organic Molecules were examined consecutively in the NSC examination over a three-year period (2022–2024). The consistent appearance of the content topic could be attributed to the CAPS prescript and the Examination Guidelines. Any omission of this content topic in a particular year could be tantamount to a deviation from the policy imperative and be regarded as non-compliance. Consequently, the frequency of appearance of Organic Molecules could be considered as predictable. However, this is acceptable predictability given that it adheres to the CAPS requirements.

The evaluator found that the pattern of asking questions was repetitive across all three years.

2022: Question 2

- Candidates were presented with a table consisting of six organic compounds. They were expected to analyse the table and then answer the questions.

2.1 Write down the:
2.1.1 Letters that represent TWO organic compounds that are isomers of each other
2.1.2 Type of isomers (CHAIN, FUNCTIONAL or POSITIONAL) identified in QUESTION 2.1.1
2.1.3 GENERAL FORMULA of the homologous series to which compound B belongs

2023: Question 2

- Candidates were presented with a table consisting of six organic compounds. They were expected to analyse the table and then answer the questions.

2.1 Define the term organic compound

2024: Question 2

- Candidates were presented with a table consisting of six organic compounds. They were expected to analyse the table and then answer the questions.

2.1 Write down the LETTER that represents EACH of the following:
2.1.1 Alcohol
2.1.2 A compound with a formyl group
2.1.3 An unsaturated compound

In all the above questions, the content topic was repeated, but the questions continued to vary. This repetition demonstrates acceptable predictability, as it aligns with the examination questions and the prescripts.

The evaluator discovered that there were many definitions or terms in this content topic. Not all the definitions were asked in a single year. This is a fair distribution of questions, as it attempts to cover most of the terms for a particular year.

c. Weighting of the topic

The analysis reveals a slight deviation in the mark allocation between the examination question papers and the CAPS or Examination Guidelines-weighted topics.

Table 3.2.3: The CAPS Weighted Prescribed Topics Against the Raw Marks in the Question Papers

YEAR	PAPER	CAPS	QUESTION PAPER
2022	2	58	50
2023	2	58	56
2024	2	58	57

According to Table 3.2.3, both the 2023 and 2024 examination question papers met the requirements of CAPS. The marks for the 2022 examination question paper differ significantly from those stipulated by the CAPS. The evaluator found that the mark allocation increased from 2022 to 2024. This could suggest that the examination topic's weighting is predictable. Nevertheless, such predictability is acceptable given that the variance of the increase is not consistent.

d. Variation in item types

The evaluation indicates that the same content topic was set using different item types over a three-year period.

The following item types were identified:

2022: Questions 2, 3, and 4:

- MCQ
- Short answer questions
- Drawing
- Theoretical explanation

2023: Questions 2, 3, and 4:

- MCQ
- Short answer questions
- Drawing
- Theoretical explanation

2024: Questions 2, 3, and 4:

- MCQ
- Short answer questions
- Drawing
- Theoretical explanation

It has been observed that the MCQs appeared consistently in all the question papers over a three-year period. These MCQs were always asked as Questions 1.1, 1.2, and 1.3. This pattern could introduce a degree of predictability, as candidates would know in advance where the Organic Molecules appear in MCQs. However, this can be considered acceptable predictability because the phrasing of the questions was never repeated. It is therefore recommended that future examination questions avoid placing the MCQs on Organic Molecules on items 1.1–1.3.

The evaluator observed that the structured questions (Questions 2–3) were consistently repeated over the three-year period, but the manner of questioning varied. The pattern consists almost entirely of tables, flowcharts, and/or graphs. Furthermore, there was evidence of content and construct validity, indicating that the examination questions met the standards set by the prescriptions.

Although the format and pattern of examination questions were repeated, this is regarded as acceptable predictability, as the question papers were aligned with the assessment prescripts.

It was found that the difficult questions (Level 3) appeared in all three years (2022–2024). The phrasing of the questions was not similar throughout the three years. In other words, different cohorts of learners were asked different questions but of the same standard and level. Consequently, there was greater variation in the question format. Although the consistency of the above item types is predictable, it should be noted that this is acceptable given the broader variation in item types.

e. Topic and skill pairing

The findings provide evidence that the following skills have been used to assess each subtopic of Organic Molecules over the three-year period:

- Drawing
- Investigating
- Identify and question phenomena
- Analysis
- Explanation
- Recall

The evaluator observed variation in skill pairings. A good example was presented when questions were asked on the tables.

2022: Question 2

- 2.3.1 Write down the STRUCTURAL FORMULA of the FUNCTIONAL group of compound F

2023: Question 2

- 2.1.4 Write down the NAME of the functional group of compound F>

2024: Question 2

- 2.3.1 Two different compounds in the above table are functional isomers. Define the term functional isomer.

In all the above years, a question on the functional group was asked. However, the skills required to answer the questions were not similar. In 2022, a question tested the learner's ability to draw the structural formula. In 2023, the skill required was recalling the name of the functional group, while in 2024 learners were expected to analyse the table and provide a definition of a functional isomer.

An observation shows that skill pairing per topic has been varied across the three years (2022–2024). Consequently, there was no evidence of the skills pairing recurring; therefore, this variation emphasises that there was no element of predictability.

f. Scenario framing of items for a topic

The patterns observed show that diverse scenarios were used, which prevented memorisation and encouraged critical thinking.

The following scenarios were used:

2022: Question 3

- The opening statement was phrased as follows:

"The melting points of some organic compounds are given in the table below".
Candidates were expected to answer questions based on the table.

2023: Question 3

- The opening statement was phrased as follows:

"The relationship between boiling point and the molecular mass of aldehydes, carboxylic acids and primary alcohols is investigated. Curves P, R and S are obtained. All compounds are straight-chain molecules".

2024: Question 3

- The opening statement was phrased as follows:

"The vapour pressures of different organic compounds are determined at 20 °C. The vapour pressures of compounds A, B and C are not shown in the table".

The above scenarios suggest that the same topic was not repeated in the past three years. This emphasises the validity of the question paper. Different cohorts could predict that the question paper would consist of scenarios. When the framing scenarios of questions vary, the predictability of the question paper is acceptable.

Table 3.2.3 below summarises the analysis conducted to determine the level of predictability for the Chemical Change topic on DBE Physical Sciences Paper 2 examinations from 2022 to 2024.

Table 3.2.3: Findings on the Predictability of the Chemical Change Topic for the DBE Physical Sciences Paper 2 Examinations from 2022–2024

Topic: CHEMICAL CHANGE							
Year	**Topic examined (✓) or not examined (X)**	**Content area/subtopics covered, including mark allocation**	**Overall weighting of the topic in marks**	**Item type/types (e.g., MCQ, essays, short answers, table, etc.) and marks allocated per content area/subtopic**	**Level of difficulty per item type used to examine the subtopic**	**Cognitive level per item type used to examine the subtopic**	**Skill assessed per subtopic**
2022	✓	Rate and extent of Reaction 23 marks	100 marks	MCQ=4 Short answers=8 Calculation=9 Identification=2	L1, L2 L2, L3 L4 L2	L1, L3 L2 L3 L3	Analysis Identification and question phenomena Calculation
	✓	Chemical Equilibrium		MCQ=2 Short answers=6 Calculation=9	L2 L1, L2, L3 L2, L3	L3 L1, L2, L3 L3	Recall Analysis Calculation

		23 marks		Explanation=6	L2, L3	L2	Theoretical explanation
	✓	Acids and Bases 22 marks		MCQ=4 Short answers=5 Calculation=13	L2 L1, L2	L2 L1, L3	Recall Calculation
		Electrochemical reactions 32 marks		MCQ=4 Short answers=12 Calculation=13 Explanation=3	L1, L2 L1, l2, l3 L2, L3, l4 L2	L1, L3 L1, l2, l3 L3 L3	Recall Analysis Calculation Theoretical explanation
2023	✓	Rate and extent of Reaction 21 marks	94 marks	MCQ=2 Short answers=3 Drawing=4 Calculation=8 Explanation=4	L3 L2 L3 L3 L3	L3 L1, L2 L3 L3 L2	Recall Drawing Analysis Calculation Theoretical explanation
	✓	Chemical Equilibrium 23 marks		MCQ=4 Short answers=4 Drawing=3 Calculation=4 Explanation=5 Description=3	L2, L3 L2 L3 L3 L2 L3	L3 L1 L3 L3 L2 L2	Recall Calculation Theoretical explanation Descriptive Drawing

	✓	Acids and Bases 22 marks		MCQ=4 Short answers=2 Calculation=16	L2, L3 L1 L2, l3	L3 L1 L3, lL4	Recall Calculation
		Electrochemical reactions 28 marks		MCQ=4 Short answers=16 Calculation=5 Explanation=3	L2, L3 L2 L3 L3	L2, L3 L1, L2 L3 L2	Recall Analysis Interpretation Calculation Theoretical explanation
2024	✓	Rate and extent of Reaction 19 marks	93 marks	MCQ=2 Short answers=5 Drawing=2 Calculation=6 Explanation=4	L2 L2 L2 L4 L2	L3 L1, L2 L3 L4 L2	Recall Drawing Calculation Theoretical explanation Deduction
	✓	Chemical Equilibrium 24 marks		MCQ=4 Short answers=8 Calculation=9 Explanation=3	L2 L2, L3 L3 L3	L2 L1, L2, L3 L4 L3	Recall Analysis Calculation Interpretation Theoretical explanation
		Acids and Bases		MCQ=4	L2	L2, l3	Description

	✓	21 marks		Short answers=5 Calculation=10 Explanation=2	L2 L2, L3 L2	L1, L2 L3 L2	Recall Calculation Interpretation
		Electrochemical reactions 29 marks		MCQ=4 Short answers=13 Calculation=5 Explanation=7	L2 L2 L3 L2	L2 L1, l2, l3 L3 L2	Recall Analysis Calculation Theoretical explanation

Table 3.2.3 presents a comparative overview of the Chemical Change topic across the three-year period. The analysis, presented in sections a to f, evaluates whether the components reflected in Table 3.2.3 have contributed to the predictability of the DBE Physical Sciences final examination question Paper 2 from 2022 to 2024.

a. Topic coverage

The findings indicate that the topic of Chemical Change appeared consistently across all three successive NSC examination question papers (2022–2024). The 2021 Physical Sciences Examination Guidelines indicate that Chemical Change should be covered and examined in every academic year. This directive aligns with the CAPS, which lists Chemical Change as one of the content topics to be examined in the Grade 12 examination. The frequency of the topic's appearance across the three-year period shows a predictable pattern in coverage. This predictability is necessary and largely acceptable, as it demonstrates that the examination question papers align with the CAPS and the Examination Guidelines.

It has also been observed that a total of nine questions were set in each examination question paper over the past three years (2022–2024). An interesting factor was noted: Chemical Change appeared as Questions 5, 6, 7, 8, and 9 in all the examination question papers. The appearance of the topic in a known question number may constitute an element of predictability.

The evaluator further noted that certain concepts are asked repeatedly. The following tables indicate the terms/definitions which were asked in successive years:

Table 3.2.4: The Terms/Definitions Asked in Successive Years

QUESTION ASKED	YES/NO IN 2022	YES/NO IN 2023	YES/NO IN 2024
Define the term reaction rate		Yes	Yes
State Le Chatelier's principle	Yes	Yes	
Define the term electrolysis	Yes	Yes	

The CAPS and the Examination Guidelines provide guidance on the examinable topics, but they do not specify how the questions should be structured. The above consistent pattern could be classified as being predictable. However, predictability is mainly acceptable as it complies with the requirements of the CAPS.

b. Content coverage

The findings suggest that Optical Phenomena and Properties of Materials were examined consecutively in the NSC examination over a three-year period (2022–2024). The consistent appearance of the content topic could be attributed to the CAPS prescript and the Examination Guidelines. Any omission of this content topic in a particular year could be tantamount to a deviation from the policy imperative and be regarded as non-compliance. Consequently, the frequency of appearance of Optical Phenomena and

Properties of Materials could be considered as predictable. However, this is acceptable predictability given that it adheres to the assessment prescripts.

c. Weighting of the topic

The analysis reveals a slight deviation in the mark allocation between the examination question papers and the CAPS or Examination Guidelines-weighted topics. Specifically, the percentage of the mark allocation in the question paper was consistently higher than the expected CAPS-stipulated mark allocation, as shown in Table 3.2.5 below.

Table 3.2.5: The CAPS Weighted Prescribed Topics Against the Raw Marks in the Question Papers

YEAR	PAPER	CAPS	QUESTION PAPER
2022	1	15	16 (10,7%)
2023	1	15	19 (12,7%)
2024	1	15	17 (11,3%)

According to Table 3.2.5, the mark allocation for the examination question papers did not meet the requirements of CAPS. We could tell from the table that the distribution of marks across the topic increased over the three years. This could suggest that the examination topic's weighting is predictable. Nevertheless, such predictability is acceptable given that the marks are distributed proportionally across the topic, which ultimately discourages patterned learning strategies. Furthermore, the slight deviation ensures that learners across different cohorts are made to respond to questions of the same weight. When this happens, the examination question papers of the three years become comparable. This practice of setting the question papers should be maintained.

d. Variation in item types

The evaluation indicates that the topic, "Optical Phenomena and Properties of Materials", was set using different item types over a three-year period.

The following item types were identified:

2022: Question 10

- MCQ
- Short answer questions
- Making deductions
- Calculation

2023: Question 10

- MCQ
- Short answer questions
- Calculation
- Theoretical explanation

2024: Question 10

- MCQ
- Short answer questions
- Graph interpretation (Wavelength vs time)

- Calculation
- Theoretical explanation

It has been observed that the MCQ appeared consistently in all the question papers over a three-year period. These MCQs were always asked as Question 1.10. This pattern could introduce a degree of predictability, as candidates would know in advance where Optical Phenomena and Properties of Materials appear in MCQs. However, this can be considered acceptable predictability because the phrasing of the questions was never repeated. It is therefore recommended that future examination questions should avoid the situation whereby the MCQ on Optical Phenomena and Properties of Materials is placed on item 1.10.

Structured questions were consistently repeated over the three-year period, but the manner of questioning varied. This could be because the examiners were adhering to the curriculum alignment. Furthermore, there was evidence of content and construct validity, indicating that the examination questions met the standards set by the prescriptions. Although the format and pattern of examination questions were repeated, this is regarded as acceptable predictability, as the question papers were aligned with the assessment prescripts.

It was found that the difficult questions (Level 3) appeared in all three years (2022–2024). The phrasing of the questions was not similar throughout the three years. In other words, different cohorts of learners were asked different questions but of the same standard and level. Consequently, there was greater variation in the question format. Although the consistency of the above item types is predictable, it should be noted that this is acceptable given the broader variation in item types.

It was also observed that the levels of cognitive demand (L1–L4) were represented in 2022 and 2023, whereas in 2024 they were L1–L3. This emphasises the comparability of the question papers over the three years. No cohort was favoured in any of the years. The

consistent distribution of cognitive demand across the topic could be considered predictable. The reference to the cognitive demand levels indicates a combination of low- and high-order thinking. This could be translated into acceptable predictability, as there is no recurrence of the low-order questions alone.

e. Topic and skill pairing

The findings provide evidence that the following skills have been used to assess each subtopic of Optical Phenomena and Properties of Materials over the three-year period:

- Interpretation
- Calculation
- Explanation
- Recall

Different drawings appeared in the question papers of all three years. The candidate was expected to interpret and use them for calculations. In the 2022 question paper, the candidates were required to interpret the effect of a light incident on a cathode. In the 2023 question paper, candidates were required to interpret the effect of the work function when two charges are separated at a table. On the other hand, the 2024 question paper required candidates to interpret the effects of different lighting conditions on a sheet. Furthermore, the candidates were also expected to perform calculations based on the given information and data. Therefore, it can be concluded that, because the same topic was not always paired with the same skill, the examination question paper may not yield predictable questions.

Questions that required candidates to calculate the carried mark allocation of 4–6. This is a slight difference that could mean that different cohorts were examined on questions with the same cognitive demands.

It was further observed that all the question papers (2022–2024) comprised difficult questions (Level 3).

f. Scenario framing of items for a topic

The patterns observed show that diverse scenarios were used, which discourage memorisation and encourage critical thinking.

The following scenarios were used:

2022: Question 10

- Light is incident on the cathode of a photoelectric cell connected to a battery and a sensitive ammeter, as shown below:

2023: Question 10

- Two small spheres, A and B, made of pure zinc are at rest 0,1 m apart on a wooden table. Sphere A is negatively charged and is free to move on the table, while sphere B is uncharged and fixed to the table, as shown in the diagram below:

2024: Question 10

- Red, blue, and green light are shone simultaneously onto a sheet of potassium, as shown in the diagram below:

The above scenarios suggest that the same topic was not repeated in the past three years. This emphasises the validity of the question paper. Different cohorts could predict that the question paper would consist of scenarios. When the framing scenarios of questions vary, the predictability of the question paper is acceptable.

Summary of findings and recommendations for the DBE Physical Sciences Paper 2

Table 3.2.6 below summarises identified patterns of predictability across key components of question paper design, along with corresponding recommendations to reduce predictability and strategies to maintain effective assessment practices without compromising variability.

Table 3.2.6: Summary of Findings and Recommendations on the Predictability of the 2022–2024 DBE Physical Sciences Paper (2)

Identified unacceptable predictability on topic coverage
When the question papers align with the assessment prescripts, that translates into acceptable predictability. Consequently, no unacceptable predictability in topic coverage was identified.
Recommendations to avoid unacceptable predictability on topic coverage
Avoid recycling questions, even if they adhere to prescripts; for example, "Define the term vapour pressure" and "Define cracking". Rather use other terms (hydrocarbons, homologous series, functional group, structural isomers, etc) to maintain the same standard.
Recommendations to avoid predictable content coverage
Ensure that the format and phrasing of questions differ while maintaining the core content. The pattern of alternating tables, graphs, and flowcharts should be maintained.

The use of selected definitions/terms enhances the acceptable predictability of the content coverage; hence, it should be maintained.
Strategies to maintain content coverage that do not lead to a predictable question paper
If tables or graphs are preferred, care must be taken to ensure they are not repeated.
Identified unacceptable predictability on topic weighting
The marks were distributed proportionally across the topics over the past three years. The slight difference in mark allocation in Organic Chemistry was consistent, leading to acceptable predictability. There was no element of unacceptable predictability.
Recommendations to avoid unacceptable predictability on topic weighting
Mark allocation should be maintained on topic weighting. Adherence to the stipulations in the relevant prescripts is essential. Disproportionate weighting must be discouraged. It is important to maintain a balance of easy, moderately difficult, difficult, and very difficult questions.
Strategies to maintain topic weighting that do not lead to a predictable question paper
Possession and reference to the assessment prescripts is essential. Ensure that the mark allocation on the examination question paper aligns with the prescripts.
Identified unacceptable predictability on item types
There has been a selection of question types (MCQ, short answer, explanation, calculations, drawing, investigative, recall) over the past three years (2022–2024). There was greater variation in the question formats across the specified curriculum topics. Therefore, no unacceptable predictability was identified across item types.
Recommendations to avoid unacceptable predictability on item types

Various categories of questions; MCQ, drawing of diagrams, explanation, calculation, naming of concepts, stating/defining, drawing of tables and graphs should be maintained. Repetition of format and pattern of questions to be maintained for preserving standard except where questions are repeated.
Strategies to maintain the assessment of item types that do not lead to a predictable question paper
Generate a question bank consisting of questions in different formats.
Identified unacceptable predictability on topic–skill pairing
The evaluator found that various skills were used to assess the same topic. In Chemical Equilibrium, questions were based on the given graphs, allowing for calculations, analysis, explanations, and deductions. The variation in skills across similar topics constitutes acceptable predictability. No element of unacceptable predictability was observed.
Recommendations to avoid unacceptable predictability through topic–skill pairing
The application of different skills to achieve the intended learning outcomes for the topics should continue. Usage of various skills in assessing the same topic should be maintained.
Strategies to maintain topic–skill pairing that do not lead to a predictable question paper
It is important to create a bigger pool of examination questions to allow for broader selection and generation.
Identified unacceptable predictability in the scenario framing of items
The contextual framing of the questions on Matter and Materials and Chemical Change has been evolving over the past three years (2022–2024). The pattern observed shows that diverse scenarios were used, which averted memorisation and encouraged critical thinking. In short, there was no identifiable element of unacceptable predictability.

Recommendations to avoid unacceptable predictability in scenario framing of items
Ensure that the context of questions on the same topic is not repeated. Employ a variety of scenarios to prevent rote memorisation and encourage critical thinking. If a table is preferred for questioning, the focus could be on vapour pressure, boiling point or the structure of the organic compounds.
Strategies to maintain scenario framing of items that do not lead to a predictable question paper
The examination question papers require continuous reference to various resources, though knowledge of the prescripts is required.

Conclusions

The evaluator found that the examination question papers for the past three NSCs were of acceptable predictive value. There was no repetition of items across the 2022, 2023, and 2024 NSC examination questions, except when the assessed curriculum was aligned with the prescripts. The format and structure of the examination questions have been maintained, including the total mark allocation, the total number of questions, MCQs, and the location of topics within the question papers. Various item types were employed, ensuring the assessment standards were valid. The use of selective scientific skills on the same topics also ensured acceptable predictability.

3.3: PHYSICAL SCIENCES PAPER 1

This section presents an analysis of the IEB final examination question papers for the Physical Sciences Paper 1 topics from 2022 to 2024. The findings for each topic are summarised in Tables 3.3.1–3.3.5.

Table 3.3.1 below provides a summary of the analysis conducted to determine the level of predictability for the Physics topic for IEB Physical Sciences Paper 1 examinations from 2022 to 2024.

Table 3.3.1: Findings on the Predictability of the Physics Topic for the IEB Physical Sciences Paper 1 Examinations from 2022–2024

Topic: PHYSICS							
Year	**Topic examined (✓) or not examined (X)**	**Content area/subtopics covered, including mark allocation**	**Overall weighting of the topic in marks**	**Item type/types (e.g., MCQ, essays, short answers, table, etc.) and marks allocated per content area/subtopic**	**Level of difficulty per item type used to examine the subtopic**	**Cognitive level per item type used to examine the subtopic**	**Skill assessed per subtopic**
2022		Kinematics	44	MCQ=10 Short answer=10 Calculation=17	L1, L2, L3 L1, L2, L3 L2, L3	L1, L2, L3, L1, L3 L3	Calculation Drawing Diagram

	✓			Drawings=7	L3	L3	Interpretation Analysis
	✓	Newton's Laws and Application of Newton's Laws	17	MCQ=0 Short answer=6 Calculation=9 Drawings=2	L1, L2 L3 L2	L1, L2 L3 L3	Calculation Drawing Recall
	✓	Momentum, Impulse, Work, Energy and Power	44	MCQ=4 Short answer=6 Calculation=26 Explanation=4 Drawings=4	L2, L3 L1, L2 L2, L3 L2 L2	L3 L2 L3 L2 L3	Recall Theoretical explanation Calculation Drawing
	✓	Gravitational and Electric Fields	24	MCQ=0 Short answer=12 Calculation=12	L2 L2, l3	L1, L2 L3	Recall Calculation
	✓	Electric Circuit	32	MCQ=2 Short answer=4 Calculation=20 Drawings=6	L2 L2 L2, L3 L2	L3 L1, L2 L3 L3	Recall Calculation Drawing
	✓	Electrodynamics	24	MCQ=4 Short answer=12 Calculation=0 Explanation=5	L3 L1, L2 L2	L3 L1, L2 L2	Recall Calculation

				Drawings=3	L2	L3	
	✓	Photons and Electrons	15	MCQ= Short answer=8 Calculation=7	 L2 L3	 L1, l2 L3	Recall Calculation
2023	✓	Kinematics	44	MCQ=6 Short answer=10 Calculation=18 Drawings=10	L2, L3 L1, L2, L3 L2, L3 L2	L1, L2, L3 L2, L3 L3 L3	Recall Drawing Calculation Interpretation
	✓	Newton's Laws and Application of Newton's Laws	42	MCQ=4 Short answer=6 Calculation=17 Explanation=5 Drawings=8 Describe=2	L2, L3 L2 L2 L2 L3 L2	L2, L3 L1 L3 L2 L3 L2	Recall Calculation Theoretical Explanation Drawing Descriptive
	✓	Momentum, Impulse, Work, Energy and Power	25	MCQ=4 Short answer=6 Calculation=15	L3 L1, L2 L3	L3 L1 L3	Recall Calculation
	✓	Gravitational and Electric Fields	20	MCQ= Short answer=6 Calculation=12 Describe=2	 L2 L2, L3 L2	 L1, l2 L3 L2	Recall Calculation Descriptive

	✓	Electric Circuit	29	MCQ=2 Short answer=8 Calculation=14 Explanation=5	L2 L1, L2 L3 L3	L2 L1, L2 L3 L2	Recall Calculation Explanation
	✓	Electrodynamics	20	MCQ=2 Short answer=6 Calculation=3 Explanation=3 Drawings=6	L2 L2 L2 L2 L2, L3	L3 L1, L2 L3 L2 L3	Recall Drawing Calculation Explanation
	✓	Photons and Electrons	20	MCQ=2 Short answer=2 Calculation=8 Explanation=3 Describe= 5	L2 L2 L1, L3 L2 L3	L2 L2 L3 L2 L3	Recall Drawing Calculation Interpretation
2024	✓	Kinematics	60	MCQ=4 Short answer=4 Calculation=30 Drawings=20 Interprete=2	L2 L2, L3 L2, L3 L2, L3 L3	L3 L1, L3 L3 L3 L3	Recall Drawing Calculation Graph interpretation
	✓	Newton's Laws and Application	21	MCQ=2 Short answer=4 Calculation=7	L2 L2 L2	L3 L1 L3	Recall Calculation Drawing

		of Newton's Laws		Explanation=5 Drawings=3	L2 L2	L3 L3	Explanation
	✓	Momentum, Impulse, Work, Energy and Power	30	MCQ=6 Short answer=11 Calculation=10 Explanation=3	L2, L3 L2 L2 L2	L3 L1, L2 L3 L3	Recall Calculation Theoretical explanation
	✓	Gravitational and Electric Fields	22	MCQ=4 Short answer=2 Calculation=13 Explanation=3	L2, L3 L2 L2 L2	L3 L1, L2 L3 L2	Recall Explanation calculation
	✓	Electric Circuit	29	MCQ=2 Short answer=10 Calculation=17	L3 L1, l2 L3	L3 L2 L2	Recall calculation
	✓	Electrodynamics	20	MCQ=2 Short answer=8 Calculation=4 Explanation=6	L2 L2 L2 L2	L2 L1, L2 L3 L3	Drawing Calculation Interpretation
	✓	Photons and Electrons	18	MCQ= Short answer=6 Calculation=12	L2 L2	L1, L2 L3	Recall Calculation

Table 3.3.1 presents a comparative overview of the Physics topic across the three-year period. The analysis, presented in sections a to f, evaluates whether the components reflected in Table 3.3.1 have contributed to the predictability of the IEB Physical Sciences final examination question Paper 1 from 2022 to 2024.

a. Topic coverage

The findings indicate that all the Physics topics (Kinematics; Newton's Laws and Application of Newton's Laws; Momentum; Impulse; Work, Energy and Power; Gravitational and Electric Fields; Electric Circuits; Electrodynamics; and Photons and Electrons) appeared consistently in all three consecutive NSC examination question papers (2022–2024). The Physical Sciences Handbook (29, updated February 2023) indicates that all seven topics should be covered and examined. This means that for the curriculum to be well represented and of an acceptable standard, all the mentioned topics should be assessed. All topics must appear annually in the examination question papers. The frequency of the topic's appearance across the three-year period shows a predictable pattern in coverage. This predictability is necessary and largely acceptable, as it shows that the examination question papers are aligned with the assessment prescripts.

b. Content coverage

The findings suggest that the topics Kinematics; Newton's Laws and Application of Newton's Laws; Momentum; Impulse; Work, Energy and Power; Gravitational and Electric Fields; Electric Circuits; Electrodynamics; and Photons and Electrons were examined consecutively in the NSC examination over a three-year period (2022–2024). The successive appearance of the content topic could be attributed to the prescript of the SAGs. Any omission of these content topics in a particular year could constitute a deviation from the policy imperative and be regarded as non-compliance. Consequently, the frequency of appearance of the seven topics could be considered as predictable. However, this is acceptable predictability given that it aligns with the prescripts.

Another notable feature was the manner in which the examiner classified the content coverage in particular topics.

Table 3.3.2: How the Examiner Classified the Content Coverage per Question on the Examination Question Papers over a Three-Year Period

QUESTION PAPER QUESTIONS	GUIDELINE TOPIC 2022	GUIDELINE TOPIC 2023	GUIDELINE TOPIC 2024
QUESTION 1	MULTIPLE CHOICE	MULTIPLE CHOICE	MULTIPLE CHOICE
QUESTION 2	Kinematics	Kinematics	Kinematics
QUESTION 3	Kinematics	Kinematics	Kinematics
QUESTION 4	Newton	Forces	Kinematics
QUESTION 5	Momentum, Impulse, Work, Energy and Power	Newton	Physics Games
QUESTION 6	Momentum, Impulse, Work, Energy and Power	Momentum, Impulse, Work, Energy and Power	Forces, Work, Energy and Power
QUESTION 7	Fields	Fields	Sport
QUESTION 8	Electric Circuit	Electric Circuit	Fields
QUESTION 9	Electrodynamics	Electrodynamics	Electric Circuit
QUESTION 10	Photons and Electrons	Photons and Electrons	Electrodynamics
QUESTION 11			Photons and Electrons

A closer observation showed that all the question papers contained the "catch-words" or the "guideline topic". In the candidate's view, this could mean that the questions in this question paper are based on the indicated guideline topic. In the 2024 question

paper, the guideline topic "Physics Games" was used in Question 5, and "Sport" was used again in Question 7. These two guideline topics do not form part of the examination topics and could therefore be misleading to candidates. On the other hand, the continuous rotation of topics while maintaining the same content coverage is considered a good practice. It ensures that different cohorts of candidates are exposed to the same high-priority content coverage while maintaining a uniform assessment standard.

Furthermore, the evaluator discovered an inconsistency in the pattern used to represent content coverage per question. The above table shows that some topics vary from one Question to another per year. For instance, in 2022 the topics Momentum and Work, Energy and Power were asked in Question 5, while in 2023 Question 5 was based on Newton, and in 2024 Question 5 was based on Physics Games. The frequency of content coverage over the past three years could serve as a basis for prediction. This content coverage is acceptable given that it is policy-driven.

c. Weighting of the topic

The analysis reveals a slight deviation in the mark allocation between the examination question papers and the SAGs' weighted topics.

Table 3.3.3: The SAG Weighted Prescribed Topics Against the Raw Marks in the Question Papers

TOPIC	SAG APPROXIMATE MARKS (± 10)	2022 MARKS	2023 MARKS	2024 MARKS
Kinematics	50	44	44	60
Newton's Laws and Application of Newton's Laws	30	17	42	21
Momentum, Impulse, Work, Energy and Power	30	44	25	30
Gravitational and Electric Fields	20	24	20	22

Electric Circuit	30	32	29	29
Electrodynamics	24	24	20	20
Photons and Electrons	16	15	20	18

According to Table 3.3.3, the 2022–2024 examination question papers varied slightly in their mark allocation.

Kinematics:

The mark allocation was very comparable in 2022 and 2023, but lower than in 2024, when it was above. It is also worth noting that the mark allocation for this topic was very close to the weighted topic as stipulated in the SAG.

Newton's Laws and Application of Newton's Laws:

The mark allocation for 2023 was higher than that for 2022 and 2024.

Momentum, Impulse, Work, Energy and Power:

The allocation of marks in 2022 was significantly higher than in the other two years, 2023 and 2024.

Gravitational and Electric Fields, Electric Circuits and Electrodynamics and Photons and Electrons:

There has been consistency in the mark allocation for these subtopics in the past three years.

In general, we could see from the table that there were some inconsistencies in the weightings applied to this subtopic. The mark allocation indicates that the deviation in the weighted score is slight. This could suggest that the weighting of the examination subtopics could be predictable. Nevertheless, such predictability is acceptable because it meets the requirement of the SAG. Furthermore, the slight deviation ensures that learners across different cohorts are made to respond to questions of the same weight.

When this happens, the examination question papers of the three years become comparable. This practice of setting the question papers should be maintained. Only the deviation in mark allocation must be corrected in the future.

d. Variation in Item types

The evaluation indicates that the same content subtopics were set using different item types over a three-year period.

The following item types were identified in the past three years:

- MCQ
- Short answer questions
- Drawing
- Calculation
- Explanation
- Describe
- Recall
- Diagrammatic interpretation

The evaluator found that the following subtopics were not included in the MCQs: Newton's Laws and Application of Newton's Laws (2022), Gravitational and Electric Fields (2022 and 2023), Photons and Electrons (2022 and 2024).

The evaluator further discovered inconsistencies in the mark allocation across different item types. The cognitive demands and the difficulty levels also varied on certain item types.

Table 3.3.4: The Allocation of Marks for Each Subtopic over a Three-Year Period

ITEM TYPE	KINEMATICS			NEWTON'S LAWS AND APPLICATION OF NEWTON'S LAWS			MOMENTUM, IMPULSE, WORK, ENERGY AND POWER			GRAVITATIONAL AND ELECTRIC FIELDS			ELECTRIC CIRCUITS			ELECTRODYNAMICS			PHOTONS AND ELECTRONS		
	2022	2023	2024	2022	2023	2024	2022	2023	2024	2022	2023	2024	2022	2023	2024	2022	2023	2024	2022	2023	2024
MCQ	10	6	4		4	2	4	4	6			4	2	2	2	4	2	2		2	
Calculation	17	18	30	9	17	7	26	15	10	12	12	13	20	14	17		3	4	7	8	12
Drawing	7	10	20	2	8	3	4		3				6			3	6				
Explanation					5	5	4					3		5		5	3	6		3	
Short Answer	10		4	6	6	4	6	6	11	12	6	2		8	10	12	6	8	8	2	6
Describe					2						2									5	
Diagram Interpretation						2															

Table 3.3.4 shows that questions requiring calculations and those with short answers appeared consistently in all the question papers over a three-year period. A question about stating a law or defining an item was also classified as a short-answer question. A concerning factor was the mark allocation per item type and per year. Further analysis showed that there has been a disparity in terms of allocation of marks. Questions requiring calculation had inconsistent mark allocations. In other years, it was found that some questions were excluded. For instance, there was no calculation on Electrodynamics in the structured questions in 2022. There were no questions requiring diagrammatic drawing on electric circuits in 2023 and 2024. This pattern could introduce some predictability,

in that candidates would know in advance that a final question could take different item types, but they may not know the mark allocation or which subtopic will contain certain questions. However, this can be considered acceptable predictability because the phrasing of the questions was never repeated.

Questions requiring short answers, including recall questions, were consistently asked over the three-year period, but the manner of questioning varied. This could be because the examiners were adhering to the curriculum alignment. Furthermore, there was evidence of content and construct validity, indicating that the examination questions met the standards set by the prescriptions. Although the format and pattern of examination questions were repeated, this is regarded as acceptable predictability, as the question papers were aligned with the assessment prescripts.

It was found that the difficult questions (Level 3) appeared in all three years (2022–2024). The phrasing of the questions was not similar throughout the three years. In other words, different cohorts of learners were asked different questions but of the same standard and level. Consequently, there was greater variation in the question format. Although the consistency of the above item types is predictable, it should be noted that this is acceptable given the broader variation in item types.

The majority of the questions requiring calculations were difficult across all the question papers. Almost all the drawings and calculations were Level 3 (cognitive demand) in terms of difficulty. Questions requiring explanation had a level 2 cognitive demand.

e. Topic and skill pairing

The findings provide evidence that the following skills have been used to assess each subtopic of Doppler Effect over the three-year period:

- Diagrammatic drawing
- Calculation
- Analysis
- Explanation
- Recall
- Description
- Interpretation

The evaluator discovered that Question 2 in all three past question papers was based on Kinematics. These questions were opened with a Graph of Velocity vs Time. In the 2022 question paper, candidates were asked to describe the motion of a child running in a straight line across a field and making turns at certain points. In 2023, the candidates were required to sketch a position-time graph for the entire motion of the ball, as represented on the velocity-time graph, while in 2024, the candidates were required to calculate the magnitudes of displacement and acceleration. Different skills were tested using the same content topic. In this case, a velocity-time graph was used.

On the Electric Circuit, all the question papers for the past three years consisted of the circuit diagram. In 2022, candidates were expected to plot a graph of the voltmeter (y-axis) vs the current (x-axis). In 2023, candidates were expected to make calculations based on the continuous change in the switch (either opening or closing), while in 2024, candidates were expected to explain the effects of opening and closing the switch.

It should be noted that various skills were required to respond to the same subtopic while adhering to the defined curriculum standards. Further analysis demonstrated that there's alignment between the skills and subtopics, while at the same time attempts

are made to protect the prescripts. The frequency of appearance of the skills constitutes an element of predictability. There's a collective variation of the skills. Consequently, the variation in skill patterns enhances acceptable predictability.

f. Scenario framing of items for a topic

The patterns observed show that diverse scenarios were used, which prevented memorisation and encouraged critical thinking.

The following scenarios were used:

2022: Question 3 (KINEMATICS)

- A small ball is thrown upwards into the air and caught when it returns to its original height 1,6 seconds after it was thrown.
- Calculate the magnitude of the initial velocity with which the ball was thrown upwards.

2023: Question 3 (KINEMATICS)

- A group of students investigate the motion of a trolley. The trolley starts from rest and is accelerated in a straight line along a frictionless horizontal surface. The students measure the change in position (Δx) of the trolley during the various time intervals (t).

2024: Question 3 (KINEMATICS)

- A ball is hit vertically upwards at 8,4 ms^{-1} from a platform of unknown height (h) above the ground. The ball lands on the ground 2,25 seconds after it is hit.

The above scenarios present three scenarios, all of which are based on motion. We noticed that the context of the same topic was not repeated over the past three years. This emphasises the validity of the question paper. Different cohorts could predict that the question paper would consist of scenarios. When the framing scenarios of questions vary, the predictability of the question paper is acceptable.

Similar approaches were observed in other subtopics, such as Gravitational and Fields; Momentum; Work, Energy and Power; Electric Circuits; Photons and Protons; and Electrodynamics.

Summary of findings and recommendations for the IEB Physical Sciences Paper 1

Table 3.3.5 below summarises identified patterns of predictability across key components of question paper design, along with corresponding recommendations to reduce predictability and strategies to maintain effective assessment practices without compromising variability.

Table 3.3.5: Summary of Findings and Recommendations on the Predictability of the 2022–2024 IEB Physical Sciences Paper (1)

Identified unacceptable predictability on topic coverage
The examination question papers of the three years (2022–2024) were fully aligned with the assessment prescripts. No unacceptable predictability in topic coverage was identified.
Recommendations to avoid unacceptable predictability on topic coverage
Proper language usage is encouraged to avoid elements of ambiguity.
Identified unacceptable predictability on content coverage

The examined content fully aligned with the intended curriculum. No unacceptable predictability in content coverage was identified.
Recommendations to avoid predictable content coverage
Refrain from overusing similar terms, especially in definitions and statements. Usage of alternative tables should be maintained.
Strategies to maintain content coverage that do not lead to a predictable question paper
It is advisable to vary the language and the use of tables and graphs.
Identified unacceptable predictability on topic weighting
There were some inconsistencies in the distribution of marks in the past three years. These occurred on some common subtopics. The change in marks was classified as acceptable, as it was not consistent.
Recommendations to avoid unacceptable predictability on topic weighting
The mark allocation should be maintained on topic weighting. There should be continuous adherence to policy and prescripts.
Strategies to maintain topic weighting that do not lead to a predictable question paper
Strict reference to the prescripts is encouraged.
Identified unacceptable predictability on item types
There has been a variety of item types (MCQs, graphs/tables, calculations, recall, theoretical explanations, short-answer questions, and interpretation). No unacceptable predictability was identified across item types.
Recommendations to avoid unacceptable predictability on item types
All the upcoming question papers should include all the subtopics in accordance with the current prescripts. There should be a balance in the item types. Questions requiring calculation should be balanced with other questions.

It is advisable to generate investigative questions.
Strategies to maintain the assessment of item types that do not lead to a predictable question paper
Repetition of format and question pattern to be maintained to preserve standard, except where questions are repeated.
Identified unacceptable predictability on topic–skill pairing
For the past three years, various skills have been used to assess the same topic. No element of unacceptable predictability was identified.
Recommendations to avoid unacceptable predictability through topic–skill pairing
The use of various skills in assessing the same topic should be maintained.
Identified unacceptable predictability in the scenario framing of items
There was a use of diverse scenarios that averted memorisation and encouraged critical thinking. There was no identified unacceptable predictability.
Recommendations to avoid unacceptable predictability in scenario framing of items
Ensure that the context of questions on the same topic is not repetitive.
Strategies to maintain scenario framing of items that do not lead to a predictable question paper
Alteration of diagrammatic features to be used to minimise recycling of scenarios.

Conclusions

The evaluator found that the examination question papers for the past three NSC examinations were of acceptable predictability. There was no repetition of items in the 2022, 2023, and 2024 NSC examination questions, except when the assessed curriculum was aligned with the prescripts. The format and structure of the examination questions have been maintained. In terms of the total mark allocation, the total number of questions, including MCQs, and the location of topics within the question papers were considered.

Various item types were employed, ensuring the assessment standards were valid. The use of selective scientific skills on the topics also ensured acceptable predictability.

3.4: PHYSICAL SCIENCES PAPER 2

This section presents an analysis of the IEB final examination question papers for the Physical Sciences Paper 2 topics from 2022 to 2024. The findings for each topic are summarised in Tables 3.4.1–3.4.3.

Table 3.4.1 below provides a summary of the analysis conducted to determine the level of predictability for the Chemistry topic for IEB Physical Sciences Paper 2 examinations from 2022 to 2024.

Table 3.4.1: Findings on the Predictability of the Chemistry Topic for the IEB Physical Sciences Paper 2 Examinations from 2022–2024

Topic: CHEMISTRY							
Year	**Topic examined (✓) or not examined (X)**	**Content area/subtopics covered, including mark allocation**	**Overall weighting of the topic in marks**	**Item type/types (e.g., MCQ, essays, short answers, table, etc.) and marks allocated per content area/subtopic**	**Level of difficulty per item type used to examine the subtopic**	**Cognitive level per item type used to examine the subtopic**	**Skill assessed per subtopic**

2022	✓	Quantitative Chemistry	0				
	✓	Chemical Bonding	0				
	✓	Energy Change Rates of Reactions	54	MCQ=8 Short answer=21 Calculation=9 Explanation=12 Drawings=4	L2, L3 L1, L2, L3 L2, L3 L2, L3 L3	L2, L3 L1, L2, L3 L3 L2 L3	Recall Theoretical explanation. Calculation Drawing
	✓	Chemical Equilibrium	27	MCQ=4 Short answer=12 Calculation=5 Explanation=6	L2 L2, L3 L3 L2	L2, L3 L2, L3 L3 L3	Recall Calculation Explanation analysis
	✓	Acids and Bases	30	MCQ=2 Short answer=21 Calculation=5 Explanation=2	L3 L1, L2, L3 L3 L2	L3 L1, L2, L3 L3 L2	Recall Calculation Theoretical explanation Analysis
	✓	Electrochemistry	51	MCQ=0 Short answer=34 Calculation=15	L1, L2, L3 L2, L3	L1, L2, L3 L3	Recall Calculation Analysis

				Explanation=2	L2	L2	Explanation
	✓	Organic	38	MCQ=6 Short answer=24 Drawing=3 Describe=3 Explanation=2	L2, L3 L1, L2, L3 L3 L2 L2	L2, L3 L1, L2, L3 L3 L2 L2	Recall Drawing Descriptive Explanation
2023	✓	Quantitative Chemistry	2	MCQ=2	L2	L2	Analysis
	✓	Chemical Bonding	14	MCQ=0 Short answer=14	L1, L2	L1, L2	Recall Descriptive Interpretation
	✓	Energy Change Rates of Reactions	26	MCQ=2 Short answer=4 Calculation=12 Drawing= 4 Explanation= 4	L3 L2, L3 L3 L3 L3	L3 L1, L2 L3 L3 L2	Recall Calculation Explanation Interpretation Analysis
	✓	Chemical Equilibrium	24	MCQ=2 Short answer=7 Calculation=7 Drawing=3 Explanation= 5	L3 L1, L2, L3 L3 L3 L2, L3	L3 L1, L2, L3 L3 L3 L2, L4	Recall Calculation Descriptive

	✓	Acids and Bases	30	MCQ=2 Short answer=16 Calculation=8 Explanation=4	L3 L1, L2, L3 L3 L2, L3	L3 L1, L2, L3 L3 L2	Recall Calculation Explanation Analysis
	✓	Electrochemistry	48	MCQ=4 Short answer=30 Calculation=11 Explanation=3	L2, L3 L1, L2, L3 L3 L3	L2 L1, L2, L3 L3 L2	Recall Analysis Calculation Explanation Comparison
	✓	Organic	56	MCQ=8 Short answer=32 Calculation=8 Explanation=7 Drawing=1	L2, L3 L1, L2, L3 L3 L1, L3 L1	L1, L2, L3 L1, L2, L3 L3 L1, L3 L3	Recall Drawing Calculation Interpretation
2024	✓	Quantitative Chemistry	6	MCQ=6	L2	L3	Calculation Comparison
	✓	Chemical Bonding	25	MCQ=2 Short answer=12 Explanation=11	L2 L1, L2 L2, L3	L2 L1, L2 L2	Recall Comparison Explanation

	✓	Energy Change Rates of Reactions	22	MCQ=2 Short answer=9 Describe=5 Drawing=2 Explanation=4	L2 L2 L2 L2 L3	L2 L1, L2, L3 L1 L3 L3	Recall Calculation Theoretical explanation
	✓	Chemical Equilibrium	26	MCQ=2 Short answer=10 Calculation=9 Explanation=5	L3 L1, L2 L3 L2	L3 L1, L2 L3 L3	Recall Explanation calculation
	✓	Acids and Bases	30	MCQ=2 Short answer=15 Calculation=9 Explanation=4	L2 L1, L2, L3 L2, L3 L2	L2 L1, L2 L3 L3	Recall Calculation Measurement Theoretical explanation
	✓	Electrochemistry	48	MCQ=2 Short answer=28 Calculation=9 Explanation=9	L2 L1, L2, L3 L2 L2	L2 L1, L2, L3 L3 L3	Drawing Calculation Analysis Theoretical explanation
	✓	Organic	43	MCQ=4 Short answer=35 Drawing=4	L2 L1, L2, L3 L3	L2, L3 L1, L2, L3 L2, L3	Recall Calculation Analysis

Table 3.4.1 presents a comparative overview of the Chemistry topic across the three-year period. The analysis, presented in sections a to f, evaluates whether the components reflected in Table 3.4.1 have contributed to the predictability of the IEB Physical Sciences final examination question Paper 2 from 2022 to 2024.

a. Topic coverage

The findings indicate that the majority of the expected topics appeared consistently across all three successive NSC examination question papers (2022–2024). According to the SAGs of the IEB, the following examination topics are supposed to form part of the final examination: Quantitative Chemistry, Chemical Bonding, Energy Change and Rates of Reactions, Chemical equilibrium, Acids and Bases, Electrochemistry and Organic.

It was further noticed that the following topics were not examined: Quantitative Chemistry (2022–2023) and Chemical Bonding (2022). Generally, all the other topics appeared successively in the previous three years. The frequency of the appearance of the topic across the three-year period shows a predictable pattern in topic coverage. The omission of the two topics means that the 2022 and 2023 question papers were not fully aligned to the intended curriculum. This omission may be considered unacceptable predictability. However, the lack of consistency in the omissions may constitute an acceptable level of predictability, as it shows that the examination question papers align with the prescripts.

b. Content coverage

The findings suggest that not all the topics were examined consecutively in the NSC examination over a three-year period (2022–2024). The discrepancy in the appearance of the content topic may indicate that the content coverage deviated slightly from

expectations in the prescripts. An omission of content topics in a particular year could amount to a deviation from the policy imperative and be regarded as non-compliance.

The evaluator found that the format and phrasing of the questions varied in the three years while maintaining the same core content. It was also noted that other content was over-emphasised at the expense of others. Consequently, the intended curriculum was not adequately represented over the two years (2022 and 2023), which could be translated into an unacceptable level of predictability.

c. Weighting of the topic

The analysis reveals a slight deviation in the mark allocation when comparing the examination question papers and the SAGs' weighted topics, as shown in Table 3.4.2.

Table 3.4.2: The SAG Weighted Prescribed Topics Against the Raw Marks in the Question Papers

TOPIC	SAG APPROXIMATE MARKS (± 10)	2022 MARKS	2023 MARKS	2024 MARKS
Quantitative Chemistry	30		2	6
Chemical Bonding	20		14	25
Energy Change and Rates of Reactions	20	54	26	22
Chemical Equilibrium	25	27	24	26
Acids and Bases	25	30	30	30
Electrochemistry	40	51	48	48
Organic	40	38	56	43

According to Table 3.4.2, the 2022 examination question paper did not exactly comply with the SAG requirements. We could tell from the table that in 2022, the topic on Energy Change and Rates of Reaction was allocated more marks than expected. The marks indicate that the weighted deviation is significant.

In 2022 and 2023, the marks allocated on the question papers were far below the stipulated SAG marks for Quantitative Chemistry. This pattern was never consistent, as the marks for each topic were not balanced across successive years. This successive balance of the weighted topics provides a degree of predictability.

Nevertheless, such predictability is acceptable because it complies with the requirement of the SAG. Furthermore, the slight deviation ensures that learners across different cohorts are made to respond to questions of the same weight. When this happens, the examination question papers of the three years become comparable. This practice of setting the question papers should be maintained. Only the deviation in mark allocation must be corrected in the future.

d. Variation in item types

The evaluation indicates that the same content topic was set using different item types over a three-year period.

The following formats or styles of questions and tasks were used to assess learners' knowledge, skills and abilities across all the topics:

- MCQ
- Short answer questions
- Graph interpretation and drawing
- Items requiring the drawing of diagrams

- Items requiring calculation
- Theoretical explanation
- Items requiring naming of concepts
- Definition or stating

It has been observed that questions on the MCQ did not appear consistently on certain topics: Electrochemistry (2022) and Chemical Bonding (2023). However, this practice was never consistent. Therefore, no one can make a conclusive judgement that the MCQ will be omitted in future years, as it was not repetitive. The appearance of similar item types could be regarded as predictable. However, this can be considered acceptable predictability because the phrasing of the questions was never repeated.

Structured questions on calculations, drawing and interpreting graphs, explaining events, and stating and defining concepts were consistently repeated over the three-year period, but the manner of questioning varied. This could be that the examiners were adhering to the curriculum alignment. Furthermore, there was evidence of content and construct validity, indicating that the examination questions met the standards set by the prescriptions. Although the format and pattern of examination questions were repeated, this is regarded as acceptable predictability, as the question papers were aligned with the assessment prescripts.

It was found that the difficult questions (Level 3) appeared in all three years (2022–2024). The phrasing of the questions varied throughout the three years. In other words, different cohorts of learners were asked different questions but of the same standard and level. Consequently, there was greater variation in the question format. Although the consistency of the above item types is predictable, it should be noted that this is acceptable given the broader variation in item types.

e. Topic and skill pairing

The findings provide evidence that the following skills have been used to assess each subtopic in Physical Sciences P2 over the three-year period:

- Interpretation
- Calculation
- Analysis
- Explanation
- Making deductions
- Descriptive
- Drawing
- Recall

In the 2022 (MCQ 1.6) and 2024 (MCQ 1.8) exams, different graph types were used to test analysis and interpretation skills. One graph was based on the Maxwell-Boltzmann distribution, while the other was based on reversible reactions. Both graphs were based on the same subtopic: Chemical Equilibrium and Reaction Rates.

This differs from the 2023 (Question 3.3), where the candidates are expected to plot a graph of reaction rate versus concentration. An observation shows that skill pairing per topic has been varied across the three years (2022–2024). Therefore, it can be concluded that since the same topic was not always paired with the same skill, the examination question paper may lead to acceptable predictability.

f. Scenario framing of items for a topic

The patterns observed show that diverse scenarios were used, which prevented memorisation and encouraged critical thinking.

The following scenarios were used:

On the topic, Energy Change and Rates of Reactions, different format of questions was asked on the same topic:

2022: Question 3

- Three different experiments were conducted in which various reaction conditions were changed. The data is tabulated below:

Experiment	Mass of Cu	Volume of HNO3	[HNO3]	State of Cu
A	2,54	0,10	0,8	Small pellets
B	2,54	0,05	0,8	Large chunks
C	5,08	0,05	1,6	Small pellets

2023: Question 3

- In each experiment, 5 cm3 of 0,15 mol/dm3 HCl was added to 25 cm3 of Na2S2O3 solution in the flask. The results are tabulated below:

EXPERIMENT	1	2	3	4	5
[Na2S2O3]	0,01	0,02	0,004	0,08	0,10
Rate/s	0,005	0,009	0,022	0,042	0,050

2024: Question 3

- The reaction of Magnesium carbonate tablets with hydrochloric acid was used to investigate the effects of different factors on reaction rates. In each experiment, the mass of the tablets was the same and equal volumes of acid were used. The results of five experiments are tabulated below:

Experiment	Concentration of acid	Initial temperature	whole tablet	Crushed tablet
1	1,0	23	46	
2	1,0	23		40
3	1,5	23	39	
4	2,0	30	31	
5	2,0	26	35	

The above scenarios suggest that the same topic was not repeated in the past three years. This emphasises the validity of the question paper. Different cohorts could predict that the question paper would consist of scenarios. When the framing scenarios of questions vary, the predictability of the question paper is acceptable.

Summary of findings and recommendations for the IEB Physical Sciences Paper 2

Table 3.4.3 below summarises identified patterns of predictability across key components of question paper design, along with corresponding recommendations to reduce predictability and strategies to maintain effective assessment practices without compromising variability.

Table 3.4.3: Summary of Findings and Recommendations on the Predictability of the 2022–2024 IEB Physical Sciences Paper (2)

Identified unacceptable predictability on topic coverage
The 2022–2024 examination question papers exclude other topics that are mentioned in the assessment prescripts. The following topics were not examined: Quantitative Chemistry (2022–2023) and Chemical Bonding (2023). Unacceptable predictability in topic coverage was identified due to consistent omission.
Recommendations to avoid unacceptable predictability on topic coverage
The annual setting of examination questions should be in full compliance with the prescribed curriculum guidelines and the assessment policies.
Identified unacceptable predictability on content coverage
The format and phrasing of questions vary while maintaining the same core content. The intended scope of the curriculum was not adequately represented over two years (2022–2023). There was an unacceptable element of predictability.
Recommendations to avoid predictable content coverage
The entire expected content should be included in the examination question papers.
Strategies to maintain content coverage that do not lead to a predictable question paper

There should be a balance in the setting of the question papers with regard to scope of the curriculum.
Identified unacceptable predictability on topic weighting
There were inconsistencies in the mark allocation over the past three years. Allocation of marks in Chemical equilibrium, Acids and Bases, Electrochemistry and Organic were comparable and predictable. No element of unacceptable predictability**.**
Recommendations to avoid unacceptable predictability on topic weighting
Mark allocation as per the SAGs should be maintained. Disproportionate weighting must be discouraged.
Strategies to maintain topic weighting that do not lead to a predictable question paper
Sustain appropriate balance of easy, moderately difficult, difficult, and very difficult questions.
Identified unacceptable predictability on item types
There has been a selection of question categories over the past three years. There was no identified unacceptable predictability.
Recommendations to avoid unacceptable predictability on item types
Maintain various categories of item types.
Strategies to maintain the assessment of item types that do not lead to a predictable question paper
Repetition of format and question patterns to be maintained to preserve standard, except where questions are repeated.
Identified unacceptable predictability on topic–skill pairing
Various skills were employed to assess the same topic. There was no element of unacceptable predictability.
Recommendations to avoid unacceptable predictability through topic–skill pairing

The application of different skills to achieve the intended learning outcomes on topics should be maintained.
Strategies to maintain topic–skill pairing that do not lead to a predictable question paper
Use various skills in assessing the same topic.
Identified unacceptable predictability in the scenario framing of items
There was a consistent pattern of using diverse scenarios to avoid memorisation and encourage critical thinking. There was no element of unacceptable predictability.
Recommendations to avoid unacceptable predictability in scenario framing of items
Context of questions on the same topic not to be repeated. Employ a variety of scenarios to prevent rote learning.
Strategies to maintain scenario framing of items that do not lead to a predictable question paper
Use different data sources, such as graphs and tables.

Conclusions

The evaluator found that the examination question papers for the past three NSCs were of acceptable predictive value. There was no repetition of items in the 2022, 2023, and 2024 NSC examination questions, except when the assessed curriculum was aligned with the prescripts. The format and structure of the examination questions have been maintained, including the mark allocation, the total number of questions, including MCQs, and the distribution of topics across the question papers. Various item types were employed, ensuring the assessment standards were valid. The use of selective skills on the same topics also ensured acceptable predictability.

PART IV DISCUSSIONS, CONCLUSIONS, AND GENERAL RECOMMENDATIONS

Section 4: Discussions, Conclusions, and General Recommendations

Sections 3.1–3.4 presented the findings of the evaluation of each topic assessed in the DBE and IEB NSC Physical Sciences examination papers. These findings were derived from a systematic analysis of examination papers administered between 2022 and 2024 to identify patterns of predictability. Building on these findings, this chapter discusses the results in relation to the study's conceptual framework and broader principles of educational assessment. It also presents evidence-based recommendations informed by the observed trends and concludes by reflecting on the implications of the findings for assessment quality, validity, and future examination design.

4.1 Discussions

The evidence presented in Sections 3.1–3.4 indicates a consistent pattern of acceptable predictability across both the DBE and IEB NSC Physical Sciences examination papers (Papers 1 and 2) administered between 2022 and 2024. These findings suggest a stable and coherent assessment framework that is closely aligned with the prescribed curriculum requirements.

Predictability in high-stakes examinations should be interpreted within the context of a balanced assessment framework. Excessive predictability may reduce cognitive demand and undermine the discriminative capacity of assessment instruments. Conversely, a stable and well-structured examination format promotes fairness, transparency, and learner preparedness. The findings demonstrate that, although the examination papers maintained structural consistency in terms of total mark allocation, the number of questions (including MCQs), and the sequencing of topics, there was no direct repetition of examination items. This indicates procedural consistency without compromising the integrity of the assessment content.

Across DBE Papers 1 and 2, consistent adherence to the examination guidelines reflects robust moderation practices and close alignment with curriculum requirements. The deliberate use of varied item types (e.g., MCQs, structured questions, calculations, data analysis, and explanatory items) strengthens both content and construct validity. Furthermore, the selective application of scientific skills to recurring content areas indicates that, although the knowledge domains remained stable, the cognitive demands placed on learners varied across examination papers. This approach promotes the assessment of higher-order thinking skills while reducing opportunities for rote learning and undue predictability.

Similarly, the IEB Papers 1 and 2 demonstrate acceptable levels of predictability and structural consistency. The absence of item repetition across the three-year cycle strengthens the credibility of the examination process. The maintenance of examination structure across years suggests strong internal quality assurance mechanisms and alignment with the SAGs. The varied application of scientific skills further strengthens the validity of these assessments by requiring learners to demonstrate conceptual understanding, procedural knowledge, and analytical reasoning.

Collectively, the findings from both assessment bodies indicate that predictability was primarily structural rather than substantive. In other words, consistency was evident in the format and topic weighting rather than in the repetition of specific questions or scenarios. This level of structural predictability is consistent with the principles of comparability and fairness that underpin high-stakes national examinations.

4.2 Conclusions

The analysis confirms that the DBE and the IEB Physical Sciences Papers 1 and 2 administered between 2022 and 2024 exhibited acceptable levels of predictability. Structural consistency was maintained in terms of mark allocation, question distribution, and topic placement, while avoiding unnecessary repetition of examination items except where justified by curriculum requirements.

The use of diverse item types and the selective assessment of scientific skills across similar content areas ensured that the examinations remain valid, reliable, and

aligned with prescribed curriculum standards. Overall, the findings indicate that the examination papers achieve an appropriate balance between structural consistency and cognitive challenge, thereby maintaining assessment integrity while minimising examination predictability.

4.3 General Recommendations

It is recommended that examination designers adopt multi-year rotation matrices to regulate the recurrence of subtopics, skills, item types, and scenario contexts across successive examination cycles. Moderation processes at the assessment body level should include explicit cross-year comparisons to identify emerging patterns, particularly in subjects where upward trends in learner performance have raised concerns about examination predictability.

In addition, the development and expansion of item-type and scenario banks would promote greater diversity in question design, reduce reliance on familiar question structures, and minimise the risk of unintentional patterning across examination papers.

Finally, the routine implementation of predictability audits based on the six analytical dimensions outlined in this report would support ongoing monitoring and help prevent the emergence of unintended patterns over time.