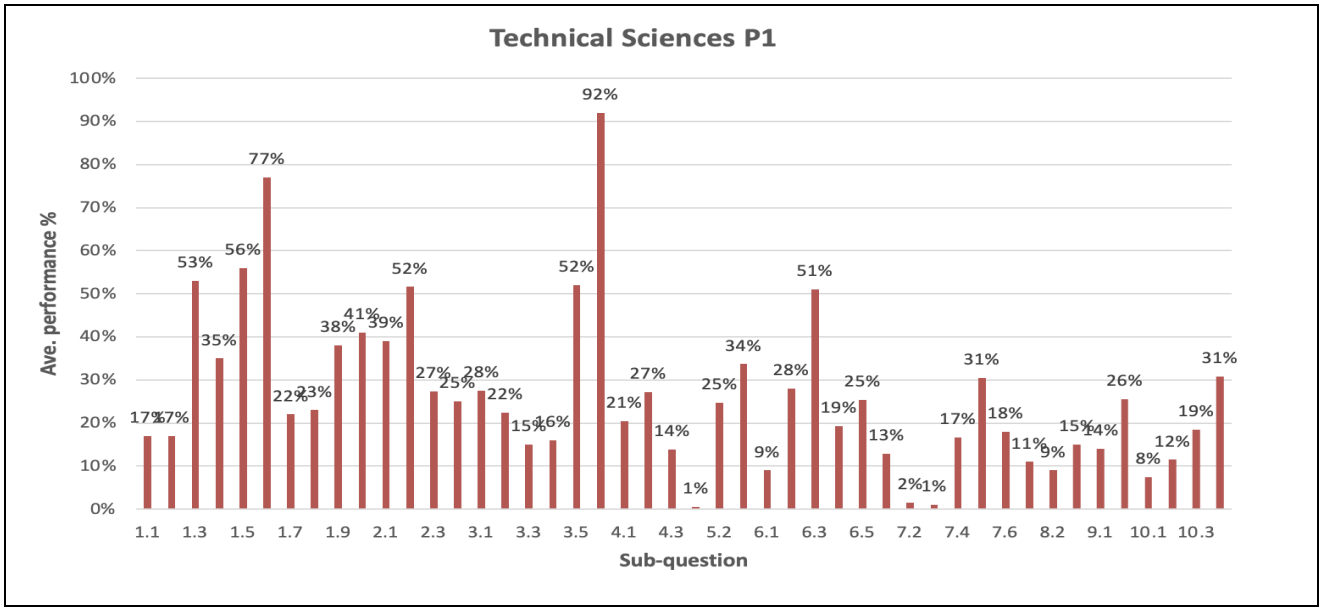
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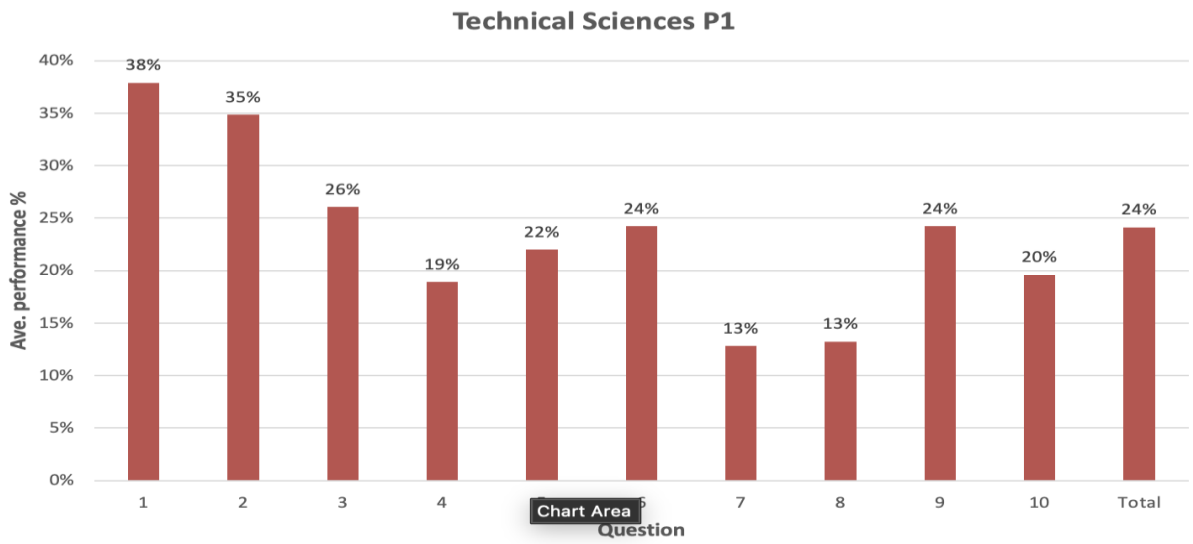
QUALITATIVE ANALYSIS OF LEARNER RESPONSES
AND
EVALUATION OF THE QUESTION PAPERS (PER PAPER)
NATIONAL SENIOR CERTIFICATE 2025
WESTERN CAPE EDUCATION DEPARTMENT

SUBJECT	**TECHNICAL SCIENCES**		
QUESTION PAPER	**1**	**2**	**3**
DURATION OF PAPER	**3 HOURS**		
INTERNAL MODERATOR	**M DIERGAARDT**		
CHIEF MARKER	**A PRINS**		
DATES OF MARKING	**FROM: 29 NOVEMBER 2025**	**TO: 10 DECEMBER 2025**	
HEAD OF EXAMINATION	**MS LM BREDENKAMP**		

REPORT 2: QUALITATIVE ANALYSIS OF LEARNER RESPONSES

SECTION 1: ***(GENERAL OVERVIEW OF LEARNER PERFORMANCE IN THE QUESTION PAPER AS A WHOLE)***





Question	Topic	Ave. performance %
1	MULTIPLE CHOICE	38%
2	NEWTONS LAWS	35%
3	MOMENTUM AND IMPULSE	26%
4	WORK ENERGY & POWER	19%
5	ELASTICITY	22%
6	HYDRAULICS	24%
7	WAVES,SOUND & LIGHT	13%
8	CAPACITORS	13%
9	ELECTRIC CIRCUITS	24%
10	ELECTROMAGNETISM	20%
Total		**24%**

Overall performance of candidate was very poor. Definitions; laws and most level 1 questions candidates could not master. In comparison with 2024 some centres improved overall and in certain questions. Calculations and topics covered last in syllabus most candidates opted to leave open. In comparison with 2024(39,8% average) the sample candidates of 2025 performed poorer with an overall average of 24%.

SECTION 2: ***COMMENT ON CANDIDATES' PERFORMANCE IN INDIVIDUAL QUESTIONS***

(It is expected that a comment will be provided for each question)

QUESTION 1	
(a)	***General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?***

1.1	NEWTONS LAWS	17%
1.2	NEWTONS LAWS	17%
1.3	MOMENTUM & IMPULSE	53%
1.4	WORK ENERGY & POWER	35%
1.5	WORK ENERGY & POWER	56%
1.6	ELASTICITY	77%
1.7	HYDRAULICS	22%
1.8	WAVES SOUND &LIGHT	23%
1.9	ELECTROMAGNETISM	38%
1.10	ELECTROMAGNETISM	41%

(b) Why was the question answered poorly? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

Most candidates performed best in the Multiple-Choice section, achieving an average score of 37%. The highest score in this section was 14 marks, while the lowest was 2 marks.

(c) Provide suggestions for improvement in relation to Teaching and Learning.

MCQs are the section in which candidates need to secure the most marks. This component covers the full Physics content of Technical Sciences and therefore should be practised as often as possible within the available timeframe for completing the syllabus. Administering a multiple-choice test at both the beginning and end of each topic can provide valuable insight into learners' interpretation errors and their overall understanding of the content.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

Most candidates followed the instructions carefully and provided one of the possible answers (A–D) instead of writing out terms, phrases or values. This reflects a strong understanding of how to respond appropriately to the requirements of the question paper.

To further improve MCQ-answering skills, educators can implement the following strategies:

- **Speed testing** before starting a topic as part of the introduction and to assess prior knowledge, followed by a **post-topic speed test** to consolidate learning and measure understanding.
- Teaching learners to **use the elimination method** when they are uncertain of the correct answer, helping them narrow down options and improve accuracy.

QUESTION 2

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?

2.1	NEWTONS LAWS	39%
2.2	NEWTONS LAWS	52%
2.3	NEWTONS LAWS	27%
2.4	NEWTONS LAWS	25%

(b) Why was the question answered poorly? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

This question started off with a higher order diagram. Due to the high cognitive level it would have influenced the confidence to complete/answer the rest of paper. Examiners must please keep in mind why the subject was introduced and not confuse the technical science learner (practical learner) with a physical science learner whom is more academically inclined. Candidates performed extremely poorly on this question. Most learners answered Question 2.1 incorrectly, as it required strong conceptualisation skills, which many struggled with.
The majority of marks in this section were gained from Question 2.2 (the free-body diagram).
In Question 2.4, most candidates were able to score marks for writing down the correct formula.

(c) Provide suggestions for improvement in relation to Teaching and Learning.

A **complete list of definitions** should be provided to learners, and they should be encouraged to memorise these thoroughly. Regular **speed tests** can assist learners in improving their recall and memorisation techniques. Teachers must ensure they are fully familiar with the **Grade 12 Examination Guidelines**, as this will enable them to emphasise the correct concepts during instruction. A clear distinction should consistently be drawn between an **applied force**, its **horizontal and vertical components**, and **frictional forces** to prevent conceptual misunderstandings.

(d) Other observations and comments useful to teachers, subject advisors, and teacher development:

Learners often confuse fundamental concepts, particularly when more than one force acts simultaneously on an object. Many show difficulty in interpreting diagrams, resolving vectors, and identifying the direction of friction correctly. Teachers should therefore make frequent use of **visual representations**, demonstrations, and scaffolded practice activities. Additionally, learners benefit from consistent exposure to **higher-order conceptual questions**, not only routine calculations, to strengthen their reasoning skills. Collaborative teacher discussions and professional development workshops can further support teachers in addressing these gaps effectively.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

Emphasis should be placed on questions that assess conceptual understanding, particularly those requiring candidates to provide **scientific explanations**. Learners should also be encouraged to draw diagrams **free-hand**, as this helps strengthen their spatial reasoning and understanding of physical situations.

Where topics are closely aligned to **specialization fields** (e.g., motor mechanics), teachers should liaise with **Technology subject teachers** to ensure that the same concepts are taught consistently across subjects. This alignment helps reinforce learning and avoids conceptual contradictions.

QUESTION 3

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?

3.1	MOMENTUM & IMPULSE	28%
3.2	MOMENTUM & IMPULSE	22%
3.3	MOMENTUM & IMPULSE	15%
3.4	MOMENTUM & IMPULSE	16%

(b) Why was the question answered poorly? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

Nowhere in the CAPS document or the Examination Guidelines is it required for a Technical Science learner to analyse or interpret graphs. Educators would therefore not have exposed candidates to this level of graphical interpretation and analysis, as it is not prescribed in any policy document. Allocating **18 marks** to a skill that is not part of the curriculum makes this question inappropriate and unfair. Candidates scored marks in Question 3.6 which is a knowledge-recall question.

(c) Provide suggestions for improvement in relation to Teaching and Learning.

Examiners should avoid setting questions that align too closely with the Physical Sciences curriculum. It is important that they familiarize themselves with the purpose for which **Technical Sciences** was introduced and ensure that the unique nature of the subject is respected. Technical Sciences learners should not be assessed in the same way as Physical Sciences learners, as the two subjects differ in focus and cognitive demand.

Teachers who teach both subjects can attest to these differences, and examiners should take this into account when designing assessment tasks to ensure that the questions are appropriate for the intended learner group.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

The definitions relevant to this topic should be practised regularly, with explicit emphasis on why it is necessary to include the terms **"total"** and **"linear"** in these definitions. It is essential that learners understand the meaning and purpose of these terms rather than memorising them mechanically. Most importantly, candidates should be exposed to a wide variety of questions that require them to provide **scientific explanations** based on underlying concepts. This will strengthen their conceptual understanding and improve their ability to apply knowledge in unfamiliar contexts.

QUESTION 4

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?

4.1	WORK ENERGY & POWER	21%
4.2	WORK ENERGY & POWER	27%
4.3	WORK ENERGY & POWER	14%

(b) Why was the question answered poorly? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

This question was extremely poorly answered. In Question 4.1, most candidates were unable to define an **isolated system**, often omitting essential key words from the definition. In addition, many candidates failed to carry out the required **unit conversions**, which further affected their performance.

The question contained numerous calculation-based items. These questions should have been **more scaffolded** to support Technical Sciences learners in working through the required steps. Questions **4.3.2** and **4.3.3** were answered incorrectly by the majority of candidates. Furthermore, formulas presented **without subscripts** were not awarded marks, resulting in many learners losing marks for the formula component.

(c) Provide suggestions for improvement in relation to Teaching and Learning.

The **principle of conservation of mechanical energy** should be taught with the following points in mind:

- Candidates must be familiar with the **definitions** as specified in the Exam Guidelines.
- Candidates must understand that **kinetic energy (EK) + potential energy (EP) = mechanical energy (ME)**.
- Substitutions in calculations should be done **accurately**, with careful attention to not switch values, such as confusing initial and final velocities.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

Learners' **conceptual understanding** should be assessed by giving regular tests **without diagrams**, requiring them to **draw their own diagrams** based on their interpretation of the scenario. This approach helps teachers identify how well learners visualize and conceptualize physical situations.

QUESTION 5

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?

5.1	ELASTICITY	1%
5.2	ELASTICITY	25%
5.3	ELASTICITY	34%

(b) Why was the question answered poorly? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

Most candidates performed poorly on this question. In **Questions 5.1** and **5.2.2**, candidates primarily scored marks for writing the **correct formulae**, with only a few gaining marks for correct substitution. Among those who substituted correctly, many **failed to include units** in their final answers.

Most candidates answered **Questions 5.2.1; 5.2.2 incorrectly**, indicating a lack of understanding of the underlying concepts in these parts.

(c) Provide suggestions for improvement in relation to Teaching and Learning.

Teachers need to be **very explicit** when presenting definitions in the classroom, and learners should be given **frequent opportunities to write down and practise these definitions**.

Regular **5–10-minute tests** on definitions should be administered to reinforce memorisation.

Developing the ability to memorise key definitions is an essential skill that requires consistent practice.

Definitions should also be **unpacked**, with teachers explaining the meaning behind the words so that learners not only memorise them but also **understand the concepts** they represent.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

Educators should teach **stress, strain, and the modulus of elasticity** together to help learners understand the relationships between these concepts. Learners should be encouraged to examine the **strain formula** and deduce its **unit**, discussing why it is expressed that way.

When explaining the **modulus of elasticity**, both the **stress and strain formulae** should be displayed clearly on the board or screen to reinforce their connection.

QUESTION 6

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?

6.1	HYDRAULICS	9%
6.2	HYDRAULICS	28%
6.3	HYDRAULICS	51%
6.4	HYDRAULICS	19%
6.5	HYDRAULICS	25%

(b) Why was the question answered poorly? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

This question was extremely poorly answered. Candidates could not state Pascals law. Calculating the area some candidates struggled with.

(c) Provide suggestions for improvement in relation to Teaching and Learning.

The way in which candidates answered this question once again highlights the importance of **teaching definitions and key phrases directly from the Exam Guidelines**. This approach helps prevent confusion caused by using terms or phrases that may describe a situation but do not constitute a formal definition.

Candidates should be encouraged to **use the Data Sheet** to verify and accurately copy equations relevant to a particular topic. This practice also allows the **SI unit system** to be consistently applied, helping learners correctly illustrate the units of their answers. Such practices should be **instilled from Grade 10** to build a strong foundation for higher-level Technical Sciences concepts.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

Teachers need to be **very explicit** when presenting definitions in the classroom, and learners should be given **frequent opportunities to write down and practise these definitions**.

QUESTION 7

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?

7.1	WAVES SOUND &LIGHT	13%
7.2	WAVES SOUND &LIGHT	2%
7.3	WAVES SOUND &LIGHT	1%
7.4	WAVES SOUND &LIGHT	17%
7.5	WAVES SOUND &LIGHT	31%
7.6	WAVES SOUND &LIGHT	18%

(b) Why was the question answered poorly? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

This question was **extremely poorly answered**. Most candidates who scored marks did so in **Question 7.1.1**, whereas the majority answered **Questions 7.2.1 to 7.4.3 incorrectly**. Very few candidates were able to answer **Question 7.4.3**correctly.

(c) Provide suggestions for improvement in relation to Teaching and Learning.

Candidates struggle to **analyze and relate diagrams** to specific topics within **Waves, Sound, and Light**, which encompass numerous subtopics. The use of **practice examples and hands-on experiments** can help learners better remember and distinguish between concepts such as **reflection and refraction**.

Additionally, explicitly **stating the properties of images formed** should be incorporated into demonstration lessons to aid in the retention and understanding of key information.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

Candidates should be **given the opportunity to conduct the actual experiment** involving the use of a **ray box**. This hands-on experience provides a valuable opportunity to **consolidate theoretical knowledge** and **strengthen conceptual understanding** of the topic.

QUESTION 8

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?

8.1	CAPACITORS	11%
8.2	CAPACITORS	9%
8.3	CAPACITORS	15%

(b) Why was the question answered poorly? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

Question was extremely poorly answered. Defining most candidates gave the definition of capacitance instead of capacitor in Q 8.2. Q 8.3.1 to 8.3.2 was extremely poorly answered.

(c) Provide suggestions for improvement in relation to Teaching and Learning.

When teaching **capacitance**, ensure that the **uses in technology** are clearly illustrated using **words, pictures, and videos**. Many candidates answered **Question 8.2 incorrectly** due to misinterpreting the question.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

Adequate time should be allocated to work through **as many problems as possible**, with learners actively **solving examples themselves**. Educators should emphasize **manipulation of equations** as a key part of daily teaching to develop problem-solving skills.

Since Technical Science learners often lack **strong mathematical foundations**, it is recommended to first **substitute values directly into the formula**, simplify the expression, and only then change the subject of the formula if necessary. This approach reduces errors and builds confidence in applying equations correctly.

QUESTION 9

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?

9.1	ELECTRIC CIRCUITS	14%
9.2	ELECTRIC CIRCUITS	26%

(b) Why was the question answered poorly? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

Question was extremely poorly answered. Most candidates scored marks in Q 9.2.1 for the formulae and substitution.

(c) Provide suggestions for improvement in relation to Teaching and Learning.

Most importantly, candidates should be exposed to a **variety of questions requiring explanations based on scientific concepts**. During teaching activities, educators should also **incorporate the use of formula sheets**, helping learners become familiar with referencing and applying formulae accurately in different contexts.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

Teachers should dedicate time to **teaching the structure and working of a transformer** before introducing any calculations. **Videos** are an effective resource to help learners visualize and understand transformer operations.

The formulae for transformers are straightforward to apply; however, since Technical Science learners often lack strong **mathematical skills**, it is recommended to **substitute values directly into the formula first, simplify, and only then change the subject of the formula**.

Regular **10-minute tests or activities** should be set up to provide learners with frequent practice in applying these skills, reinforcing both conceptual understanding and calculation accuracy.

QUESTION 10

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?

10.1	ELECTROMAGNETISM	8%
10.2	ELECTROMAGNETISM	12%
10.3	ELECTROMAGNETISM	19%
10.4	ELECTROMAGNETISM	31%

(b) Why was the question answered poorly? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

Question was poorly answered. Most candidates could not answer Q10.1 AND Q 10.2 that is about Lenz 's law. Candidates that scored marks scored marks in 10.4 .

(c) Provide suggestions for improvement in relation to Teaching and Learning.

Learners often struggle with **using the correct formulae**. Many candidates are also **unsure of the appropriate units of measurement** to apply. While candidates generally understand **which formula to use**, their limited proficiency in **mathematical manipulation** often prevents them from arriving at the correct solution.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

Teachers should dedicate time to **teaching the structure and working of a transformer** before introducing any calculations. **Videos** are an effective resource to help learners visualize and understand transformer operations.

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