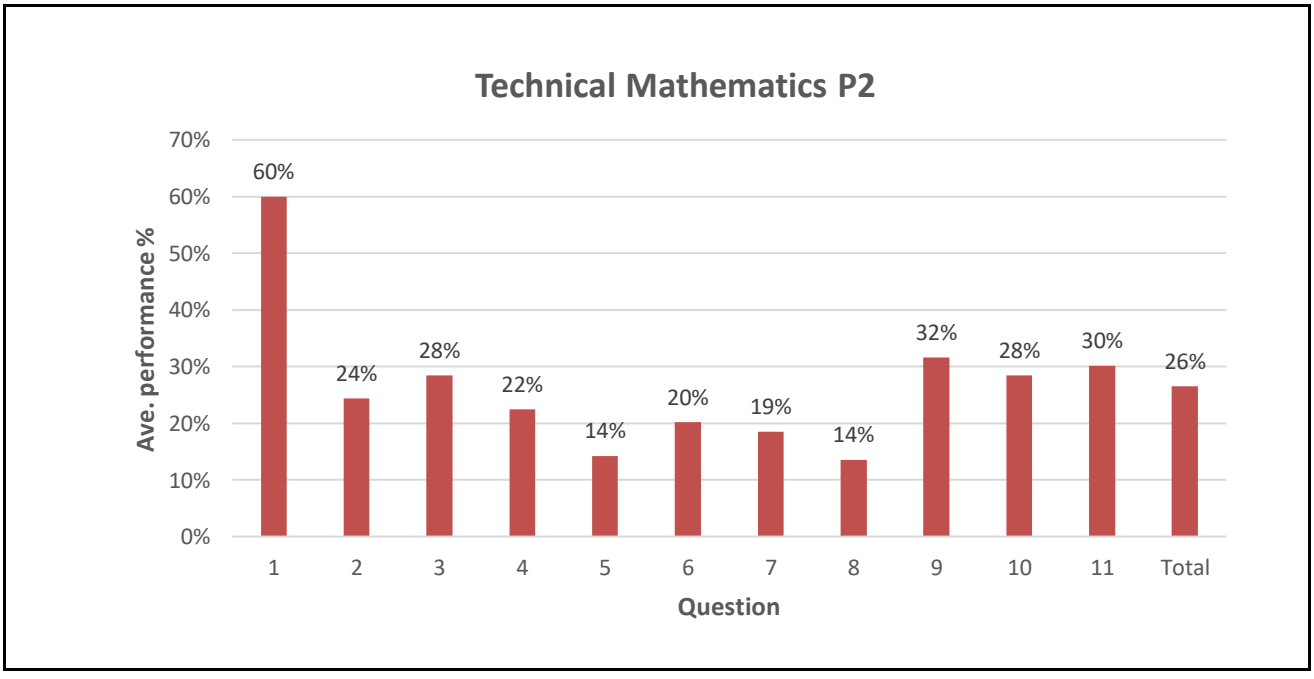
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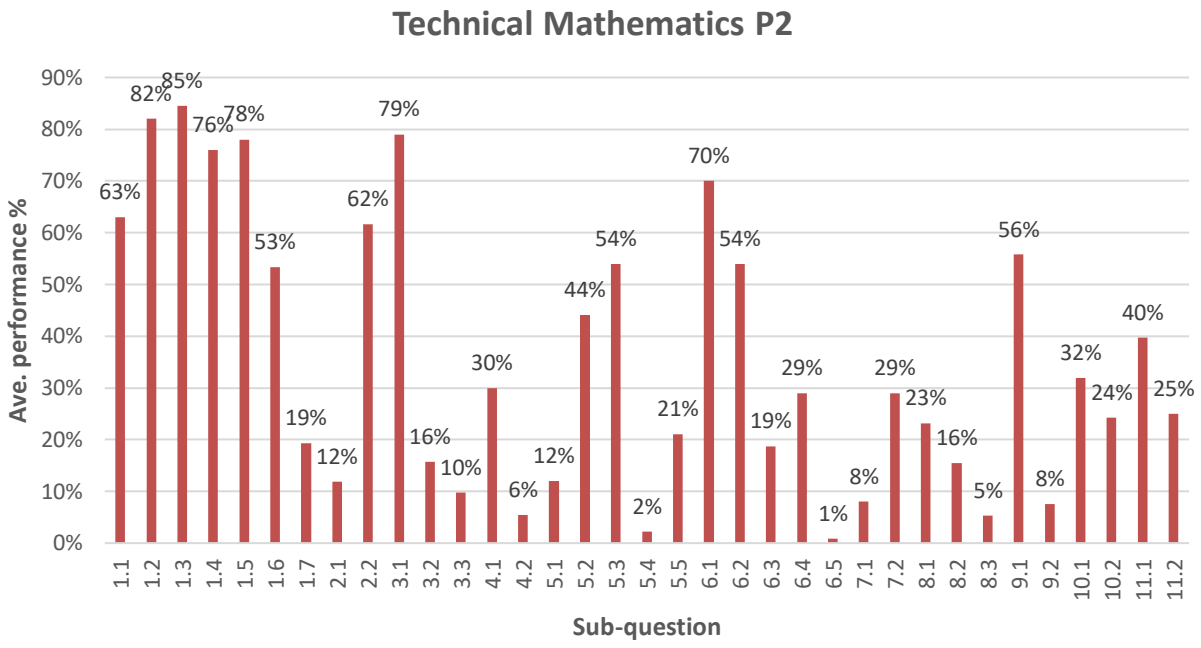
QUALITATIVE ANALYSIS OF LEARNER RESPONSES
AND
EVALUATION OF THE QUESTION PAPERS (PER PAPER)
NATIONAL SENIOR CERTIFICATE 2025
WESTERN CAPE EDUCATION DEPARTMENT

SUBJECT	**TECHNICAL MATHEMATICS**		
QUESTION PAPER	**1**	**2**	**3**
DURATION OF PAPER	**HOURS**		
INTERNAL MODERATOR	**MONGAMELI MBUSI**		
CHIEF MARKER	**OLGA GRUNDER**		
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)***





SECTION 2: ***COMMENT ON LEARNERS' 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?
Most learners attempted the question, but it is still disappointing that a lot of learners cannot identify the correct formula from the information sheet. The average for this question is 60%.
(b) Why was the question answered poorly? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.
Common errors: • Some learners write the correct incorrect gradient and midpoint formulae
(c) Provide suggestions for improvement in relation to Teaching and Learning.
• The lack of basic knowledge still needs attention. Learners need to know that the gradient of parallel lines are equal and that the product of the gradients of perpendicular lines is equal to minus one. • Write frequent short tests at the beginning of the period, asking them to write down the formula for the gradient of a line, the distance formula etc. This is basic knowledge that they need to know.

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

- In Analytical Geometry there will always be questions to determine the equation of a line through one point and parallel or perpendicular to a given line. This is something learners must practice.
- Teachers must give the exact information sheet used in the NSC examination at the BEGINNING of the year, so that students know where to find the correct formula for each topic.

QUESTION 2

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

- Poorly answered by some centres. Average of 24%.
- Most learners didn't attempt coordinates of M, and the question was 5 marks.
  The question relied on previous question and learners didn't get the value of k correctly.

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

- Poor knowledge of basic formulae or basic substitution. Lack of practice.
- Learners had to use the value of r^2 in 2.1.1 to determine the value of k
  Many of the learners did not get the equation of the circle, so 2.1.2 was left unanswered.
- The sketching of the ellipse was satisfactory, though some learners swapped the coordinates, leading them to lose all 3 marks.

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

- The equation of a circle is not included on the information sheet. This should be emphasized by teachers.
- This question is supposed to be a routine procedure for the learners to identify and use the correct formula, but a lot of them use the equation of a straight line or an ellipse.

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

- Another useful option to determine the equation of a tangent to a circle and not often used is:

$$x.x_1 + y.y_1 = r^2$$

QUESTION 3

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

- The average for this question is 28%. Question 3.1 was not friendly to learners, 3 marks question $\sqrt{\sin B + \sec A}$, learners were expected to perform 3 skills, substitution, changing identity and square root, most learners got it wrong.
- Trig equation for 4 marks $\cot\theta = -0,587$, learners didn't know how to change it to tan, and couldn't get reference angle, and didn't know that they were also expected to identify quadrants.

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

- Using the calculator to find the reciprocal ratio is still challenging to most learners.
- Most learners didn't attempt the trig equation, and those who attempted it couldn't do much.

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

- Dedicate more time to practicing calculator skills and operations. These are easy marks to obtain.
- Teach students to first substitute the given values into the expression before attempting to find the reciprocal. It's important to understand that even if the reciprocal is incorrect, you can still earn a mark for correctly performing the substitution step.
- Focus more on reinforcing the relationships between sec and cos, sine and cosec, as well as tan and cot in class.
- Encourage students to begin by completing the diagram on the Cartesian plane right from the start of the question. Label the given values on the diagram and use Pythagoras to calculate the unknown side.

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

Here is what the relevant documents specify:

- **CAPS document:** Determine the solutions of trigonometric equations for $0° \leq \theta \leq 360°$.
- **ATP:** Trigonometric equations for $\theta \in [0°; 360°]$.
- **Examination Guideline:** Determine the solutions of trigonometric equations for $\theta \in [0°; 360°]$ **limited to routine procedures**.

The question remains: **Are the following types of questions considered routine procedures, as outlined in the examination guidelines?**

- $2\cos\theta + \sin\theta = 0 \ \ for \ \ \theta \in [0°; 360°]$ (NSC November 2019)
- $\sin A + 2\cos^2 A = 2$ (NSC November 2020)
- $2\sin x = 3\cos x \ \ for \ \ x\epsilon[180°; 360°]$ (NSC November 2024)
- $\cot\theta = -0,587$ (NSC November 2025)

QUESTION 4

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

- Poor performance, average of 22 %. The lack of basic knowledge could be noted.
- The learners struggled to answer basic facts regarding the reduction formulae.
- Reduction and Identity questions were not complex, it is clear learners were not prepared.

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

- These were basic reduction formulae that learners are expected to answer.
- Disappointing to see some learners cannot complete the identity question.
- Most learners struggled to determine the lowest common denominator (LCD), and therefore could not prove the identity.

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

Emphasize the mastering of the correct use of the CAST diagram to determine whether a trigonometric ratio is positive or negative in each quadrant.

Highlight the importance of using the information sheet to apply key trigonometric identities, such as:

- $\sin^2\theta + \cos^2\theta = 1$
- $1 + \tan^2\theta = \sec^2\theta$
- $1 + \cot^2\theta = cosec^2\,\theta$

Learners need to practice the **rearranging of these identities** to make a specific variable the subject, for example $1 - \sin^2\theta = \cdots$.

Learners need to express $\tan\theta$ and $\cot\theta$ in terms of $\sin\theta$ and $\cos\theta$

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

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QUESTION 5

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

The average for this question is 14 %.

- Graphs were drawn for the learners, and they needed to interpret and answer questions.
- Graphs were drawn from 0 -–180, that seemed to intimidate most learners.

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

- Terminology seemed to be a problem, learners didn't know period of the graph, amplitude and zeros.

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

- Teachers must not only focus on drawing the trig graphs but also spend more time teaching learners how to interpret the graphs.
- Grade 11 work needs regular practice.
- Special attention needs to be given to correct notation.

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

- A thorough exploration of the fundamental characteristics and features of graphs is essential.
- The properties of the function like period, range and amplitude must be practiced.

QUESTION 6

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

- Compared to last year, there is a clear and significant improvement in the results for question 6.
- The average for this question is 20 %.
- This question was fairly assessed, yet learners didn't take advantage.

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

- In Questions 6.2 to 6.4, the most common mistakes occurred when learners incorrectly used values or sides from different triangles and substituted them into the sine rule or the area rule to calculate the length of a side in a specific triangle. This approach is invalid, as the rules apply only within the same triangle, and such errors result in incorrect calculations and a breakdown in the solution process.
- In question 6.5, learners were expected to determine whether triangle is a right angled, yet they already assumed the ninety degrees, question was 5 marks.

(c)	***Provide suggestions for improvement in relation to Teaching and Learning.***
• **Sine rule**: The emphasis should be on identifying the triangle to work in and being able to use the given information in that triangle. • Learners need to know when to use a certain rule. • Teachers need to do more exercises that prove the right angled triangle.	
(d)	***Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.***
• Teachers must emphasize the fact that the sine, cosine and area rules apply to one triangle at a time. • Learners cannot substitute values from different triangles.	

QUESTION 7	
(a)	***General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?***
• Poorly answered. The average for this question is 19 %. • It is evident that learners do not know their theorems and correct reasons.	
(b)	***Why was the question answered poorly? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.***
• In question 7.2.2 learners were even provided table, with statements, they needed to provide only reasons, and they again never took advantage of so easy questions.	
(c)	***Provide suggestions for improvement in relation to Teaching and Learning.***
• In question 7.1 the opposite angles of a cyclic quadrilateral are tested. Teachers must spend more time on applying circle theorems **and** their **converses** in calculations to solve geometry problems.	
(d)	***Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.***
• Success in this question requires a solid understanding of the fundamental theorems and their converses. • It is essential to use the correct reasons outlined in the Examination Guidelines document.	

QUESTION 8

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

The average for this question is 14 %.

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

- Once again, learners were unable to give correct reasons for statements made.

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

- Q8.1, 8.2, 8.3 Learners can be coached to spot the correct angles even if they cannot articulate the correct reason.

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

- Learners should be encouraged to use the given diagram in the answer book to track their reasoning path regarding the angles. Write down all the angles calculated on the diagram. This also assists markers to follow the reasoning of the learner.
- In certain cases, marks are awarded only when both a correct statement and its supporting reason are provided. If a candidate gives the correct statement but fails to include a valid reason, the mark cannot be awarded. Therefore, it is essential to not only make accurate statements but also to provide the correct reasoning to support them.
- When providing a reason involving co-interior, alternate, or corresponding angles, it is essential to specify the parallel lines in the explanation. Without mentioning the parallel lines, the mark for the reasoning cannot be awarded.

QUESTION 9

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

- The average for this question is 32%.
- The learners performed better in this as also the question was very easy.

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

- 9.1.1, It was disappointing to see that many learners struggled with this question, which was designed to test basic knowledge and should have been straightforward. The question was to fill correct proportionality and reason in form of table.
- The reason were in general incorrect. " Prop theorem only with no // lines" or " // lines", without prop theorem.

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- 9.2 this was also very easy to prove ratios, given two triangles and all sides dimensions.

(c)	***Provide suggestions for improvement in relation to Teaching and Learning.***
• It is evident that some learners fail to read the information provided at the beginning of the question. • Teachers should emphasize the importance of thoroughly reviewing the given information before attempting to answer.	
(d)	***Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.***
• It is important that teachers and learners know that the reasons, provided in the Examination guidelines, are the only reasons acceptable in the Marking Guideline.	

QUESTION 10	
(a)	***General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?***
• The average for this question is 28 %. • Language played a factor on how learners responded on this question. • Some learners even struggled to convert degrees to radians, very disappointing at that level.	
(b)	***Why was the question answered poorly? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.***
• 10.1.1: The question explicitly asks for rotational frequency, learners didn't know that n is rotational frequency in the formula. • 10.1.2, learners didn't know which radius to use, with most using 310 mm • 10.2.1 learners struggle to change degrees to radians. • 10.2.2, learners substituted degrees in formula, did calculations with degrees.	
(c)	***Provide suggestions for improvement in relation to Teaching and Learning.***
• Learners must once again ensure they read the questions carefully and respond specifically to what is being asked. • Allocate more time to practicing unit conversions.	
(d)	***Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.***
• More practice is needed on these questions, as they are easy questions.	

QUESTION 11

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

Most of the questions were attempted. The average for this question is 30 %.

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

- The learners had many misconceptions regarding this formula:
  $A_T = a(m_1 + m_2 + m_3 + \cdots m_n)$
  Instead of calculating: $m_1 = \frac{0_1 + o_2}{2}$, they substituted the lengths of the ordinates.
- 11.1, the question was easy but learners didn't read to answer what question requires.

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

- There are two formulas given on the information sheet for the mid-ordinate rule.
  There is a lot of confusion between the two formulas and students "mix and match" them.
  A suggestion would be to pick one of the formulae and constantly apply the same formula in class so there cannot be any misconceptions.

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

- This question is purely direct application of formulae that are always provided, teachers must emphasize key words since these questions are contextual in nature.
- They must show learners how to use key words from statements and link with certain formula.