CHAPTER 10

MATHEMATICS

The following report should be read in conjunction with the Mathematics question papers for the NSC November 2025 examinations.

10.1 PERFORMANCE TRENDS (2021–2025)

The number of candidates who sat for the Mathematics examinations in 2025 increased by 2 927, compared to that of 2024.

There was a decline in the pass rate this year. Candidates who passed at the 30% level and above changed from 69,1% in 2024 to 64,0% in 2025. There was a corresponding change in the pass rate at the 40% level and above over the past two years from 47,9% to 41,9%.

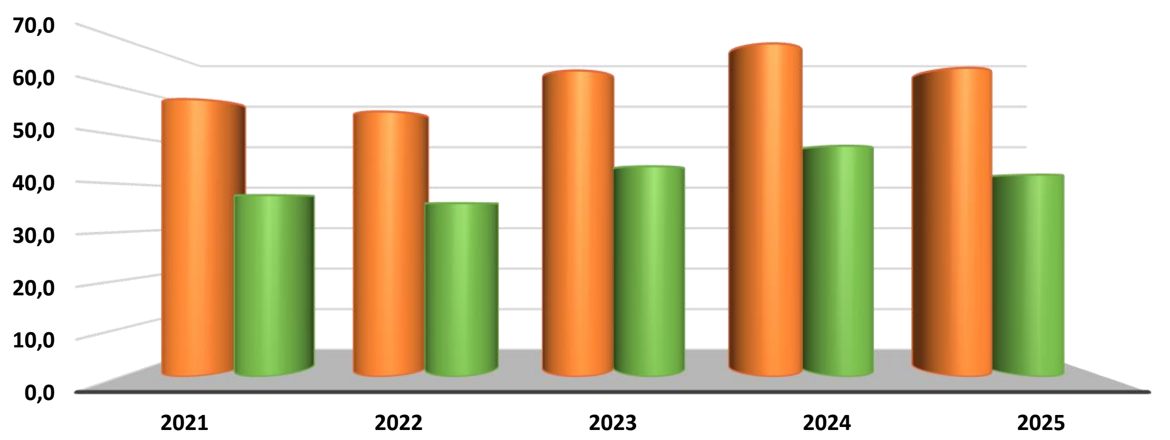
There was also a decline in the percentage over 80% from 3,9% in 2024 to 1,9% in 2025. The total number of distinctions has shown a decrease for the past two years from 9 808 in 2024 to 4 834 in 2025.

The various intervention strategies employed by teachers, subject advisors and provincial education departments were continued in 2025. The resourcefulness and diligence of the above-average candidates contributed to the overall results in the subject.

Table 10.1.1 Overall achievement rates in Mathematics

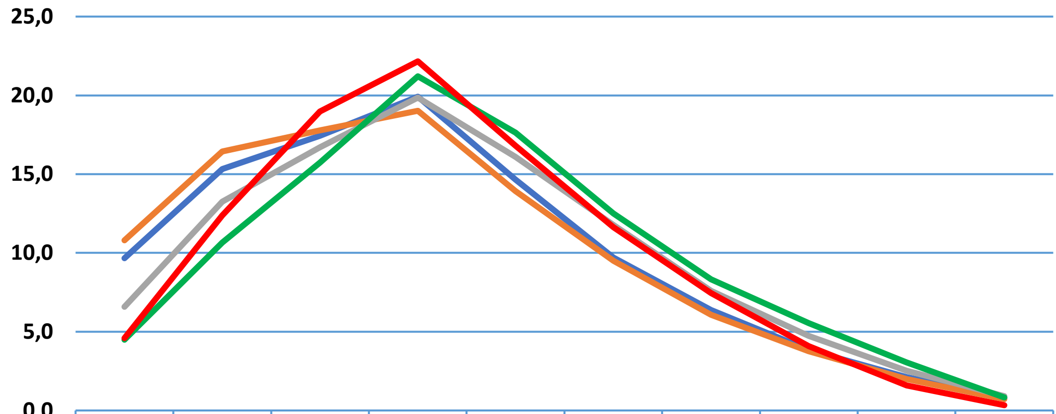
Year	No. wrote	No. achieved at 30% and above	% achieved at 30% and above	No. achieved at 40% and above	% achieved at 40% and above
2021	259 143	149 177	57,6	97 561	37,6
2022	269 734	148 346	55,0	97 041	36,0
2023	262 016	166 337	63,5	114 311	43,6
2024	251 488	173 774	69,1	120 430	47,9
2025	254 415	162 947	64,0	106 570	41,9

Graph 10.1.1 Overall achievement rates in Mathematics (percentage)



	2021	2022	2023	2024	2025
% achieved at 30% and above	57,6	55,0	63,5	69,1	64,0
% achieved at 40% and above	37,6	36,0	43,6	47,9	41,9

Graph 10.1.2 Performance distribution curves in Mathematics (percentage)



	0-9.9	10-19.9	20-29.9	30-39.9	40-49.9	50-59.9	60-69.9	70-79.9	80-89.9	90-100
2021	9,7	15,3	17,4	19,9	14,7	9,7	6,4	3,8	2,1	0,8
2022	10,8	16,4	17,8	19,0	13,9	9,5	6,1	3,8	2,0	0,7
2023	6,6	13,3	16,7	19,9	16,1	11,8	7,6	4,7	2,5	0,9
2024	4,5	10,7	15,7	21,2	17,6	12,5	8,3	5,6	3,1	0,8
2025	4,6	12,4	19,0	22,2	16,8	11,6	7,4	4,1	1,6	0,3

10.2 OVERVIEW OF CANDIDATES' PERFORMANCE IN PAPER 1

(a) The style of questioning was different from previous years making the paper less predictable.

(b) While calculations and performing well-known routine procedures form the basis of answering questions in a Mathematics paper, a deeper understanding of definitions and concepts cannot be overlooked. Candidates did not fare well in answering questions that assessed an understanding of concepts, even where these questions were accessible to them.

(c) Many candidates were able to answer the knowledge and routine questions correctly. This suggests that the candidates were well prepared to deal with these questions. Candidates scored some marks in most of the questions.

(d) The algebraic skills of the candidates were poor. Most candidates lacked fundamental and basic mathematical competencies which should have been acquired in the lower grades. This made manipulation of expressions and complex calculations challenging for many candidates.

10.5 OVERVIEW OF CANDIDATES' PERFORMANCE IN PAPER 2

(a) Although the question paper felt familiar to candidates, the questions required candidates to answer with understanding rather than with only procedural answers. This will require many teachers to adjust their way of teaching and teach the entire curriculum with understanding rather than using the last five years' past papers to drill the candidates in answering each topic.

(b) Candidates were not careful when using a calculator, especially in the Statistics questions. They entered the data incorrectly and arrived at answers that were close to the correct answer. This resulted in an unnecessary loss of marks.

(c) Candidates made assumptions about features in a question by looking at the diagrams in the Analytical Geometry and Euclidean Geometry sections. They used these assumptions in their answers without first proving that the relationship is true. Candidates who made use of assumptions in their answers were penalised.

(d) Candidates struggled with questions that involved the integration of topics.

(e) As mentioned in previous reports, candidates needed to exercise caution with algebraic manipulation skills since overlooking certain basic principles or practices results in the unnecessary loss of marks.

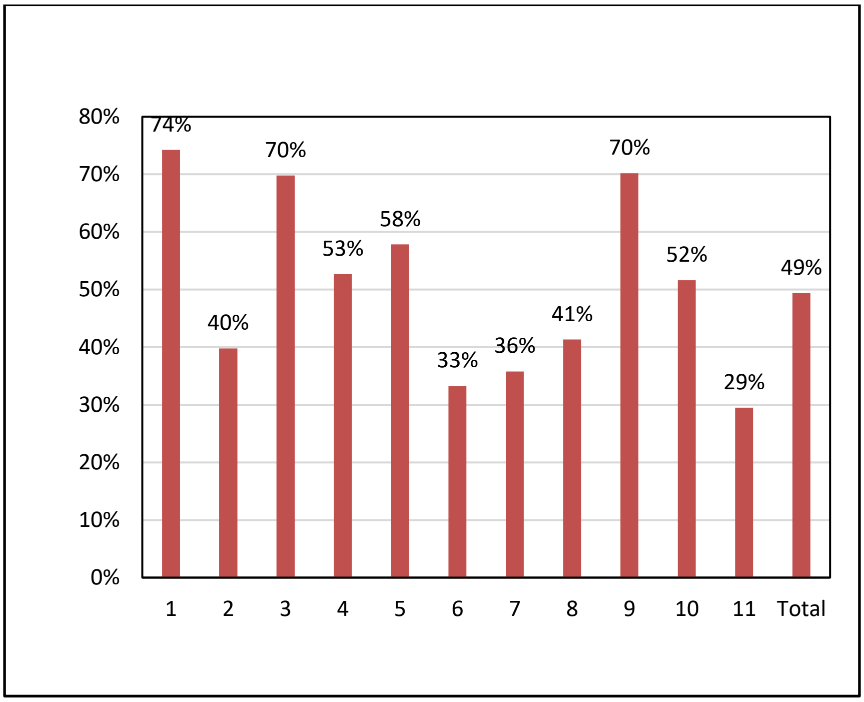
(f) Candidates presented incoherent answers to Euclidean Geometry questions. They need to be aware that they are not awarded for correct statements that do not follow logically.

(g) Candidates struggled with reasoning in problem-solving questions which required analysis of the information given and critical thinking to devise a plan of action to solve the problem.

10.6 DIAGNOSTIC QUESTION ANALYSIS FOR PAPER 2

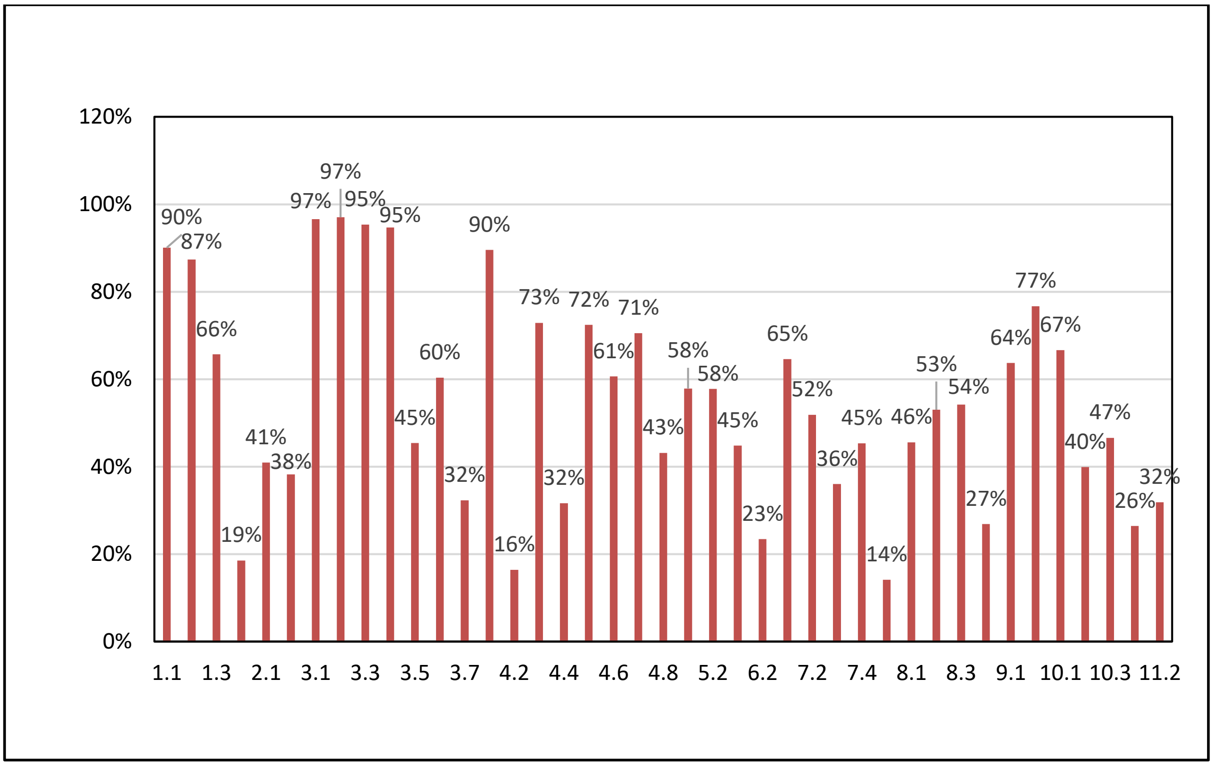
The following graph was based on data from a random sample of candidates' scripts. While this graph might not accurately reflect national averages, it is useful in assessing the relative degrees of challenge of each question as experienced by candidates.

Graph 10.6.1 Average performance per question in Paper 2



Q	Topic(s)
1	Data Handling
2	Data Handling
3	Analytical Geometry
4	Analytical Geometry
5	Trigonometry
6	Trigonometry
7	Trigonometry
8	Trigonometry
9	Euclidean Geometry
10	Euclidean Geometry
11	Euclidean Geometry

Graph 10.6.2 Average performance per subquestion in Paper 2



10.7 ANALYSIS OF CANDIDATES' PERFORMANCE IN EACH QUESTION IN PAPER 2

QUESTION 1: DATA HANDLING

Common errors and misconceptions

(a) When writing the equation in Q1.1, many candidates interchanged the values of a and b. Another common error in this question was that candidates failed to round off their answers for a and b correctly to two decimal places. Some candidates did not enter the data correctly into the calculator. They arrived at answers that were close to the correct answers for a and b.

(b) In Q1.2 some candidates tried to predict the selling price of a car that is 5 years old from the table rather than using the equation of the *least squares regression* line.

(c) Many candidates struggled to interpret and use the *correlation coefficient* in Q1.3. They gave the answer as 'strong negative correlation'. This showed a lack of understanding of the reason behind this calculation and reading for understanding when answering Q1.3.

(d) Most candidates were unable to link the *least squares regression* line to a *straight-line* function. This resulted in a large majority of candidates being unable to write down the estimated average yearly decrease in the selling price of the cars in Q1.4.

Suggestions for improvement

(a) It should not be taken for granted that learners are able to round off correctly to two decimal places. In this regard, an exercise on rounding can help correct any misconceptions.

(b) Teachers should link the equation of the *least squares regression* line ($y = a + bx$) with the equation of the *straight-line* and emphasise that 'a' refers to the *y-intercept* and 'b' refers to the *gradient*. This requires teachers to integrate these topics and not teach them in isolation.

(c) As stated in previous reports, when determining the equation of the *least squares regression* line, it is advisable that learners write down the values of a and b and then write down the equation of the regression line. In this way, they can get the CA mark for the equation.

(d) Learners need to be taught the meaning of the *correlation coefficient* rather than just describe the association between the variables as *strong/weak* and *negative/positive*. Teaching for understanding is necessary.

(e) As mentioned in previous reports, learners should be able to use the values of their calculations to make predictions and comments about the data. Time should be devoted to interpretation questions.

(f) Statistical language and contexts should be used in class when teaching *data handling* as learners will then become familiar with the terminology used and be able to differentiate between the concepts being tested in the various questions.

(g) As indicated in previous reports, the concept of *independent (y)* and *dependent (x) variables* should be emphasised when working with the equation of the *least squares regression* line. The *y value* depends on the *x value* and not vice versa.

QUESTION 2: DATA HANDLING

Common errors and misconceptions

(a) Many candidates struggled to interpret the given cumulative frequency table and found it challenging to calculate the *frequencies* for each *class interval*. Consequently, they were unable to answer Q2.1.2 and Q2.1.3 correctly. A reason for this could be the lack of correct reading of each interval and the assumption that the cumulative frequency table given was similar to the frequency tables found in previous years' question papers. The total for the number of people who visited the website in a day was incorrectly answered as 252 instead of 70.

(b) A large number of candidates used the *cumulative frequencies* to draw the *histogram* in Q2.1.3. Others incorrectly drew *bar graphs* or *ogives* instead of the *histogram* required. They were not awarded marks for this.

(c) In Q2.1.4 many candidates struggled to interpret the skewness of the data from the *histogram*.

(d) Q2.2 required candidates to read with understanding. Many candidates worked only with the data of the 8 learners given and not 9 as required. As a result, the *standard deviation* was calculated incorrectly. This affected the answers of the rest of the question.

(e) There were many candidates who were unable to understand and communicate the relationship between the *data points* that were outside one *standard deviation* of the *mean*.

Suggestions for improvement

(a) Reading for understanding is a fundamental requirement in the *Statistics* section and must be developed in classroom activities.

(b) The poor performance in Q2 was largely due to misreading of *statistical tables*, confusion between *frequency* and *cumulative* frequency, and weak conceptual understanding of *mean* and *standard deviation* adjustments. These errors highlight the need for stronger emphasis on reading for understanding, correct interpretation of *cumulative frequency* tables, and conceptual teaching of statistical measures.

(c) Teachers need to revise the graphs taught in lower grades. This teaching must include clearly distinguishing between the parameters and needs of the different graphs.

(d) *Measures of central tendency* and *dispersion* need to be taught for both *ungrouped* and *grouped* data. The focus of teaching should be on the clear understanding of the concept rather than the calculation of values.

(e) Much of this question was based on *cumulative frequency*, which is done in Grade 11. Revision of Grade 11 work in Grade 12 will assist learners to prepare for the examinations.

QUESTION 3: ANALYTICAL GEOMETRY

Common errors and misconceptions

(a) Some candidates were unable to substitute correctly into the distance formula when answering Q3.1. Other candidates calculated the length of PQ instead of PR.

(b) In Q3.2 some candidates swopped the *x*- and *y*-values around when substituting into the gradient formula.

(c) Some candidates were unable to use the answer calculated in Q3.2 when answering Q3.3.

(d) Q3.5 was poorly answered by most candidates. Candidates did not read the order of the parallelogram PQRS and subsequently calculated S in the incorrect quadrant. Most candidates were unaware that *transformation* and *translation* concepts could be used for the calculation of the fourth vertex of a parallelogram.

(e) Q3.6 was not well answered by most of the candidates as they assumed that T was the midpoint of QR. Other candidates did not realise that T was the point of intersection of lines PT and QR.

(f) In Q3.7 many candidates were able to calculate the *area* of the parallelogram PQRS. Various errors were made in the use of the sine rule as incorrect angles were selected from the diagram, others interpreted PQRS as a rectangle (ignoring the information provided to them in the question), others used the *shoelace method* and were only awarded full marks if their answer was correct and a large number of candidates assumed that two of the sides were perpendicular to each other.

Suggestions for improvement

(a) As stated in previous reports, if learners are not sure, they should consult the information sheet for the correct formula.

(b) It is important that learners realise that it is not acceptable to make any assumptions, e.g. that a certain point is the midpoint of a line; two lines are perpendicular to each other or that a triangle is isosceles.

(c) Teach learners to analyse diagrams in Analytical Geometry and to use relevant properties to respond to questions.

(d) Teachers should teach learners how to calculate the fourth vertex of a parallelogram using the *transformation* method.

(e) As stated in previous reports, learners should be advised that they need to fill in the calculated values and additional information on their sketch in the answer book as they proceed with subquestions. This helps them visualise what information is at their disposal when answering the next sub-question.

(f) Teach learners how to identify when to use which formula: area = $\frac{1}{2}$base × height or area = $\frac{1}{2}a.b.\sin C$ when calculating the area of a triangle.

(g) Learners should be advised to expect that Euclidean Geometry facts and Trigonometry will be integrated into Analytical Geometry and will be needed in the answering of some Analytical Geometry questions.

(h) When teaching Analytical Geometry, teachers need to revise the concepts of *perpendicular* and *parallel* lines with respect to *gradient*, simultaneous equations (linking to functions), *inclination* and correct calculations of *surds*. This revision should also include emphasising that the calculation of the equation of a *straight-line* depends on the points on that line and not any points appearing on the diagram.

(i) The properties of all quadrilaterals must be taught in earlier grades and used in classwork and tasks through the later grades.

QUESTION 4: ANALYTICAL GEOMETRY

Common errors and misconceptions

(a) Most candidates struggled to show $q = 4$ in Q4.2. This was due to candidates not being able to recognise right-angled triangles and that radii AM = ME = $q + 1$. Many of these candidates assumed AD = 3 units.

(b) Candidates were able to identify the centre of the circle in Q4.3 but many struggled to calculate the value of the radius, possibly because these candidates did not realise that point E lies on the circumference of the circle.

(c) In Q4.4 many candidates misread the question and made assumptions of what they thought the question may be asking. Evidence of this was that these candidates added 2 units to the *x*-value of –6.

(d) Candidates who struggled with Q4.5 made the following errors: substituted $(y-4)^2 = 0$ rather than just y = 0, swapped the values of x and y around or equated each of the brackets to 25.

(e) Most candidates calculated the *gradien*t of BC in Q4.6 without first calculating the coordinates of the point C. Other candidates who struggled with Q4.6 were unable to recall that the *radius* of a circle is *perpendicular* to its *tangent* or their formula for the *gradient* was incorrect despite this being given in the information sheet.

(f) While many candidates knew the method for solving Q4.7, their equation of BC was incorrect from Q4.6 which negatively impacted them in this question. Other candidates assumed the *y*-value of C to be –2.

(g) Q4.8 was challenging for the majority of candidates as it required a multistep approach to arrive at the answer. Candidates used *gradients* that did not relate to the required angle; calculated distances and used these in an incorrect trigonometric ratio or assumed E to be the midpoint of DC. Some candidates introduced an angle θ in their working but did not indicate this on their sketch. They then went on to calculate many other angles but also referred to each of them as θ. These candidates became confused about the correct size of each of the angles calculated.

Suggestions for improvement

(a) As mentioned in previous reports, teachers need to revise the concept of *perpendicular lines* and *gradients*, particularly that the *tangent* is *perpendicular* to the *radius* at the *point of contact*.

(b) Learners should practise using a formula to get an answer (e.g. using the formula to calculate the coordinates of the midpoint), as well as to calculate an unknown variable if the answer has been given (e.g. calculate the coordinates of an endpoint if one endpoint and the midpoint are given).

(c) Teachers should aim at developing in learners the ability to reason logically and to write down the steps in their reasoning.

(d) For learners to be able to reason and answer complex questions, they need a very good understanding of basic concepts, including those from lower grades. Regular revision of these concepts can help consolidate understanding them.

(e) As mentioned in previous reports, learners need to be taught to read with understanding. This is vital in answering any question posed to the learner.

QUESTION 5: TRIGONOMETRY

Common errors and misconceptions

(a) In Q5.1 some candidates struggled to interpret $\tan 50° = k$ in terms of trigonometric definitions, resulting in them not being able to calculate the adjacent, opposite and hypotenuse of the right-angled triangle in terms of k. Many candidates were unable to apply Pythagoras' theorem correctly and these candidates calculated $r = \sqrt{k^2 - 1}$ or $r = \sqrt{1 - k^2}$.

(b) In Q5.1.2 some candidates were unable to identify the double angle expansion given in the question or that the denominator had a common factor of -2 before the double angle formula of $\cos 2\theta$ could be used.

(a) Q5.1.3 was not well answered as many candidates did not realise that $10°$ could have been written as $50° - 40°$. Thereafter, they could have used the *compound angle* formula for either *sine* or *cosine* to obtain the answer. Other candidates showed weak algebraic skills when answering Q5.1.3.

(b) Some candidates were unable to apply *co-ratios* correctly in Q5. In Q5.1.3 some incorrectly wrote $\sin 10° = \sin 80°$ and in Q5.2.1 they incorrectly wrote $\cos(90° + x) = \cos x$.

(c) Q5.2.2 was poorly answered by candidates, if attempted at all, as they failed to recall that a *square root* must be positive when presented in the form given, or that the denominator of a fraction may not be 0.

Suggestions for improvement

(a) Teachers should ensure that all learners are able to answer any type of definition question using trigonometric ratios. Regular revision of Grade 10 and 11 Trigonometric concepts can help consolidate this work.

(b) As stated in previous reports, remind learners that the same simplification skills used in Algebra also apply to Trigonometry. Revise addition, subtraction and simplification of algebraic fractions with learners before teaching simplification of trigonometric expressions and proving trigonometric identities. This revision should also include the understanding of when a number is undefined (division by 0) or non-real (square root of a negative number) and interval or inequality notation.

(c) Teachers should emphasise the use of the information sheet when working with compound angles. This has been emphasised in numerous previous reports.

(d) Teachers should expose learners to questions on trigonometric ratios involving combinations of compound angles, angles greater than 360° and co-ratios.

(e) As mentioned in previous reports, teachers must discuss the difference between an angle and a trigonometric ratio at the beginning of the study of Trigonometry in Grade 10. The relevance of an angle in the trigonometric ratio must be emphasised.

(f) Teachers should expose learners to a few methods of simplifying trigonometric expressions. However, they should develop skills in learners that allow them to answer questions in the most efficient way.

QUESTION 6: TRIGONOMETRY

Common errors and misconceptions

(a) In Q6.1 some candidates struggled with the application of basic trigonometric reduction, the square and quotient identities and factorisation. Together with this, many candidates struggled to work with fractions, in particular combining two terms into one term and factorisation of cubes and grouping proved challenging to many candidates.

(b) The given arithmetic sequence in Q6.2 confused most candidates as it was an unexpected inclusion of a Paper 1 topic into Paper 2. Some candidates used the definition of a geometric sequence instead of an arithmetic sequence; the rejection of 45° was not indicated in most of the candidates' answers.

Suggestions for improvement

(a) As stated in previous reports, teachers should remind learners that they must still use the reduction formulae together with the compound angle formulae when answering questions in Grade 12.

(b) Teachers should stress the importance of showing the signs and steps when reducing trigonometric ratios.

(c) Teachers should advocate the use of the *k*-method when dealing with quadratic equations involving trigonometric ratios. A simplified quadratic equation may be easier to solve.

(d) Teachers should explain the difference between the general solution and the specific solutions within an interval. This point was covered in previous reports.

(e) Expose learners to different types of exercises involving reduction, identities and fractions.

(f) Teachers need to teach with the entire Mathematics syllabus in mind and not in silos. Learners need to be able to integrate knowledge across topics and between different papers.

(g) Teachers should spend time revising the general solutions to basic trigonometric equations and then integrate these into the more complex trigonometric equations.

(h) Learners need to practise many examples independently of all trigonometric content.

QUESTION 7: TRIGONOMETRY (GRAPHS)

Common errors and misconceptions

(a) Few candidates were unable to answer Q7.1 correctly. They indicated that the period of the graph was $135°$, which was the endpoint of the given interval. These candidates did not know the effect the coefficient of the angle had on the basic trigonometric function.

(b) In Q7.2 some candidates had difficulty with sketching the graph of $g(x) = \tan 2x - 1$ correctly because the *asymptotes* of this graph were outside the given interval.

(c) Most candidates did not use the direction of the *translation* of the graph in Q7.3, leaving their answers as $h(x) = \cos(2x + 45°)$ or $h(x) = \cos(2x - 45°)$.

(d) In Q7.4 some candidates confused the variables of the *domain* and *range*. Others could not represent their answers using the correct notation. They presented their answers as $y \in [1\,;\,-1]$ or $-1 \geq y \geq 1$, both of which were incorrect.

(e) Many candidates failed to recognise the link between the question and the given graphs. Other candidates calculated the *x-intercept* but ignored the change in inequality due to the common factor of -1 when candidates were required to manipulate $\tan 2x - 1$ to $-(1 - \tan 2x)$.

Suggestions for improvement

(a) It is necessary for learners to be reminded constantly of the meaning of concepts like *period, domain, amplitude* and *range.*

(b) Learners need to be exposed to the drawing of all trigonometric graphs, including *translations* and *transformations*.

(c) As mentioned in previous reports, learners should be taught that the period of a trigonometric function is the length of a function's cycle. Since this value is a length, it is a single number and not an interval of values, nor is it an endpoint of the given interval.

(d) Learners should be shown how to write intervals, using both inequality and interval notations. Teachers are encouraged to use both forms of notations in class. It is good practice to write an interval in one form and then ask learners to write the same answer in the other form.

(e) As emphasised in previous reports, teachers should teach the 'mother graphs' well so that learners can develop insight into their characteristics. Thereafter, learners must be exposed to how the change in the different parameters affect the 'mother graphs'.

(f) Interpretation of graphs should be taught with understanding rather than learners assuming what the question is asking.

QUESTION 8: TRIGONOMETRY

Common errors and misconceptions

(a) In Q8.1 some candidates assumed that AB = 18 cm instead of using the given ratio to calculate the length of AB. Many candidates could not interpret the given proportion: AB **:** BC = 1 **:** 2.

(b) Many candidates did not recognise that ABCD is a rectangle and consequently they did not realise that they needed to use *Pythagoras' Theorem* to answer Q8.2.

(c) In Q8.3 many candidates assumed the length of BK to be 18 cm and then used the sine rule to calculate KC. This was incorrect and candidates lost all the marks in this question.

(d) Q8.4 required candidates to calculate an angle that was not drawn on the diagram. Candidates opted to use the sine rule instead of the cosine rule. This led to candidates incorrectly assuming that $K\hat{A}C = K\hat{A}B + B\hat{A}C$. They did not realise that these angles lie in different planes and therefore their sum does not lie in a triangle.

Suggestions for improvement

(a) As emphasised in previous reports, teachers should devote the appropriate amount of time to this section. This should allow learners to score the accessible marks in this section of work.

(b) Teachers need to develop strategies to be used when solving right-angled triangles and triangles that are not right-angled. Teach learners when to use basic trigonometric ratios and which basic ratio is the appropriate one for a given context.

(c) As mentioned previously, it might be a good idea to give learners an exercise in which they identify which rule is to be used to solve the question. Learners must also substantiate why they think that the rule that they have selected applies to the question.

(d) Remind learners that the sine and cosine rules are applicable to a single triangle. Learners may not create a proportion by using the sides and angles or two different triangles using the sine and cosine rules.

(e) Learners need to be reminded constantly that they may not make assumptions about the lengths of sides and the sizes of angles based on the diagram. Learners must work with the information that they are given in the question.

QUESTION 9: EUCLIDEAN GEOMETRY

Common errors and misconceptions

(a) While Q9.1 was answered well by candidates who had learnt the theory, others drew incorrect constructions, labelled the angles incorrectly or did not draw any construction.

(b) Some candidates, in answering Q9.2.1, used *ext* $\angle \Delta$ without first showing that $P\hat{L}O = \hat{P} = 32°$.

(c) Many candidates provided incorrect reasons for their statements in Q9.2.2.

Suggestions for improvement

(a) As mentioned in previous reports, teachers are encouraged to use the 'Acceptable Reasons' in the *Examination Guidelines* when teaching. This should start from as early as Grade 8. Learners should be issued with a copy of the 'Acceptable Reasons'.

(b) Learners should be made to prove theorems as part of their informal tasks. A good strategy is to expect learners to write the proof of a theorem as a task the day after the theorem was explained in class. Teachers should also choose random letters to label the triangles and not stick to the conventional A, B and C.

(c) Teachers should make use of a diagram with annotations to explain a theorem. Illustrate which information is given and what conclusions can be made from this given information.

(d) As emphasised in previous reports, teachers must insist that learners read the information given in the question. This information contains key words that direct learners to the theory required to solve the question.

(e) Teach learners to identify all the theorems and converse theorems that are applicable to a question and how to select from these which ones can be used to answer the question. A clear distinction needs to be made between a theorem and its converse.

QUESTION 10: EUCLIDEAN GEOMETRY

Common errors and misconceptions

(a) In Q10.1 some candidates assumed that PT was the diameter of the circle before proving it. This is using information from Q10.3 in Q10.1. This was not accepted. Other candidates equated angles that were not in the same *segment*.

(b) When answering Q10.2 some candidates indicated that the opposite angles of a *cyclic quadrilateral* were equal instead of them being supplementary. Other candidates confused *co-interior angles* and *corresponding angles*.

(c) Q10.3 was poorly answered by many candidates as they could not provide the correct reason of *converse angles in a semi-circle* or *line subtends* $90°$.

Suggestions for improvement

(a) The need for learners to name the angles correctly has been mentioned previously in several reports. Teachers should not credit learners with marks in school-based assessment tasks if the angles are not named correctly.

(b) It should be emphasised to learners that the theorem *angles in the same segment* can only be used when all four vertices lie on the circumference of the same circle.

(c) Teachers need to emphasise when to use the converse theorems in proofs. Teachers must take note that *converse co-interior angles, converse alternate angles* and *converse corresponding angles* are NOT accepted. Instead, learners should be taught *co-interior angles supplementary*, *alternate angles equal* and *corresponding angles equal*.

(d) It is advisable to train learners to reason logically and to write corresponding statements and reasons when teaching Euclidean Geometry in Grade 8. This should enable learners to present coherent proofs or solutions in Grade 12.

(e) Learners should be guided on what parts of the proof are required to link it to the conclusion. A good tactic would to be to ask learners to determine their goal for the proof, i.e. if PT is a diameter of the circle then $\hat{Q}_1 = 90°$, therefore the learners should then go about reasoning how to calculate $\hat{Q}_1$ to be $90°$; or to prove PQ || SR then $\hat{V}_4 = \hat{Q}_1$, then learners can calculate the values of $\hat{Q}_1$ and $\hat{V}_4$ separately to arrive at the correct conclusion.

QUESTION 11: EUCLIDEAN GEOMETRY

Common errors and misconceptions

(a) Many candidates failed to determine the link between the given ratios and the ratio required to calculate in Q11.1. Others treated the ratios as actual lengths. This was incorrect.

(b) In Q11.1.2 some candidates did not know how to express a new ratio using a previously calculated ratio. Other candidates showed poor algebraic simplification skills.

(c) Most candidates incorrectly assumed a perpendicular height for the triangles, while others used the area rule with incorrect sides in Q11.1.3. Many candidates were unable to recognise that the trapezium's area was a subtraction of a triangles from a bigger triangle.

(d) In Q11.2.1 many candidates omitted the parallel lines in the reason for the proportionality theorem. This was not accepted and candidates were not awarded the mark for the reason.

(e) Many candidates attempted to answer Q11.2.3 using the incorrect triangles. Some confused similarity and congruency and indicated pairs of lines equal in their proof for similarity. This was a breakdown.

(f) Q11.2.4 and Q11.2.5 were not attempted by most candidates, while others tried to manipulate what was required to prove in Q11.2.5 to arrive at an answer.

Suggestions for improvement

(a) As mentioned in previous reports, more time needs to be spent on the teaching of Euclidean Geometry in all grades. Learners should read the given information carefully without making any assumptions. Exercises on Grade 11 and 12 Euclidean Geometry must include different activities and all levels of the taxonomy.

(b) Teach learners not to assume any facts in a geometry sketch but to only use what was given and that which was already proven in earlier questions.

(c) Learners need to be made aware that writing correct statements that are irrelevant to the answer in Euclidean Geometry will not earn them any marks in an examination.

(d) Consider teaching geometry with the approach of using different colours to identify sides and angles; using different variables when working with ratios and using previous sub-questions to answer later sub-questions.

(e) Learners need to be told that success in answering Euclidean Geometry comes from regular practice, starting off with the easy and progressing to the difficult.

(f) It is critical that during teaching and learning, learners are exposed to problem-solving questions where critical thinking is required.