



2020 NATIONAL SENIOR CERTIFICATE MATHEMATICS DIAGNOSTIC REPORT – FEEDBACK

At the end of each academic year the Department of Basic Education (DBE) releases a diagnostic report which summarises the performance of the learners, per section, in the final National Senior Certificate (NSC) examinations. Each year very similar outcomes are evident as learners fall short in topics not taught in Matric, but rather on the concepts, which lead up to that point. These basic concepts form part of the Senior phase and FET phase curriculum and are taught leading up to Matric. Unfortunately the rigorous CAPS curriculum does not afford Grade 12 educators the time to reteach these basic concepts. The teachers then assume that the learners are proficient in these skills and continue to build upon these poorly formed foundations. It is this inability to perform basic calculations, which hinders the performance of the learners in the final examinations.

“Performance in the 2020 examination revealed an overall deficiency in the understanding of basic concepts across some topics in the curriculum”-Angie Motshekga: 2020 Diagnostic report

The following document outlines where the learners fall short and in what grades each of these concepts are taught.

As a country we need to direct our resources to bridging these gaps in learners knowledge with the aim of putting down a solid foundation before building on them. This is where the greatest impact will be felt.



General Findings:

- Algebraic skills are poor which filters into almost every question in paper 1 and some in paper 2. These skills should be acquired and mastered in grade 8 and 9 to lessen the negative effect felt in the final examinations.
- Learners have a poor **UNDERSTANDING** of definitions and concepts and this prevents them from being successful in the higher order questions.

Calculator use:

- Teachers should demonstrate the correct steps when using a calculator (finance)
- Using the calculator to solve problems with integers (bracket use)
- Pythagoras (function on the SHARP)
- Rounding off is a struggle. (Calculator can be set to round to a certain number of places to eliminate this confusion.)
- Learners need to continuously practice their calculator skills (stats functions specifically)



SUMMARY OF TARGET AREAS

PAPER 1

Algebra

- Thorough teaching of factorisation is required.
- Rounding off skills are poor and should not be taken for granted.
- Equations need to be taught in such a way that BALANCE is maintained and an understanding of inverse operations is acquired.
- Teachers should take time to teach Inequalities on a number line and how to represent inequalities on and from the number line.
- To apply the rules for differentiation a solid foundation of in basic algebraic operations is required. Eg: Factorisation, converting surds to exponential form and simplification of basic algebraic expressions.

Number patterns

- Emphasise position and value of the terms in a sequence.

Functions

- Emphasise the **WHY** behind the equations of vertical and horizontal lines.
- Focus on the concepts and the reason these concepts make sense when teaching functions at the start. Show **WHY** the x value is zero on the y axis etc.
- Pay close attention to transformations and how they influence a set of points (function) rather than just one single point.
- Teachers should spend time discussing the basic concepts of a function (Input and output values) paying close attention to the relationship between x and y, and that every x has a y and visa versa.
- The correct transformation terminology needs to be used. (translate rather than shift)

Probability

- Misunderstanding of **AND** and **OR** in the description of events.
- Reiterate the concept of “at least”.
- Encourage learners to draw tree diagrams when dealing with compound events.



PAPER 2

Data Handling

- Rounding off is an issue. Focus needs to be put on rounding in earlier grades.
- Reference is made on numerous occasions in the report of the importance of calculator work in this topic. Learners should be given multiple opportunities to practice calculator skills.
- Learners should draw graphs and interpret graphs more often in earlier grades.

Geometry

- Substitution into formulae remains a problem.
- Routine should be followed each time and care taken when using a calculator.
- Learners need to master the properties of triangles and quadrilaterals in the earlier grades. Including formulae for area of shapes.
- Learners should be given the chance to link geometry to the Cartesian plane from the start. Eg: calculate area from the coordinates given.
- Revise concepts of perpendicular lines and gradients.
- Focus on parallel lines and their angles, revise these constantly and explain the difference between using something given to prove an additional fact, and proving the fact true using what you have been given.
- Equations of straight lines need to be revised.
- Learners should be taught to scrutinise the images provided and use all information provided.

Trigonometry

- Learners have poor calculator skills.
- Integers on the calculator as well as using the theorem of Pythagoras.
- Learners struggle to link the trigonometry to algebra and thus manipulate expressions correctly.
- Regular practice of algebraic skills needs to be implemented.
- Attention needs to be drawn to the link between the trigonometric expressions and algebraic expressions.
- Candidates are unable to manipulate simple expressions with fractions.
- The correct use of brackets to be encouraged.

GRADE 8 FOCUS

This is where our resources need to be aimed in Grade 8.

Algebraic expressions need to be **UNDERSTOOD**.

- Like terms
- Simplifying expressions
- Solving equations
- Manipulating expressions

Equations need to be taught as a sequence of inverse operations

Inequalities need to be represented on a number line and correct notation used

Number patterns: emphasise the formulae and what each variable represents

- Teach using the correct terminology
- Draw attention to the **VALUE** and **POSITION** of the term in a sequence

Functions should be taught so that learners understand that every input value has an output value

- Attention needs to be drawn to the input and output relationship
- x and y should be used as well as input and output so that the link can be seen and explored from the beginning
- Calculations and manipulations to find the “formula” when given the input and the output should be practiced

Probability should be taught in more detail

- Correct language needs to be used
- **AND** and **OR** need to be explained and shown using real life relatable examples so that a solid understanding of the difference is developed

Geometry needs to be shown using hands on shapes

- Understanding of units and conversions of cube and square units needs to be visually represented
- Properties of shapes needs to be a focus
- Formulae need to be explained and developed on their own so that an understanding of **WHY** and **WHAT** they are doing is developed
- Parallel lines and perpendicular lines need to be focussed on
- Parallel lines and the angles they create need to be visualised rather than just accepted. Learners need to understand what happens if lines are **NOT** parallel and the importance of stipulating which lines are parallel

GRADE 9 FOCUS

This is where our resources need to be aimed in Grade 9

Algebraic expressions need to be **UNDERSTOOD**.

- Like terms
- Simplifying expressions
- Solving equations
- Manipulating expressions
- Factorising: needs to be taught for understanding rather than rote learning
- Exponents rules need to be explored rather than accepted
- Surds and exponents need to be linked using the laws of exponents so that surd laws are easier in grade 10

Equations need to be taught as a sequence of inverse operations.

- Understand the difference between linear and quadratic equations
- Understanding that any number multiplied by zero is zero and relating that to the factorised format of the quadratic equation

Inequalities need to be represented on a number line and correct notation used

- Convert from one type to the other seamlessly
- Understand the greater than less than symbols and how they are applied
- Explain inequalities graphically (on Cartesian plane with a function)

Number patterns: emphasise the formulae and what each variable represents

- Teach using the correct terminology
- Draw attention to the **VALUE** and **POSITION** of the term in a sequence

Functions should be taught so that learners understand that every input value has an output value.

- Attention needs to be drawn to the input and output relationship
- x and y should be used as well as input and output so that the link can be seen and explored from the beginning
- Calculations and manipulations to find the “formula” when given the input and the output should be practiced
- Use Cartesian planes to show **WHY** the x axis has a y value of zero and why we substitute zero for y to find the x cut etc. Rather than asking kids to remember and simply accept the rule
- Use the Cartesian plane to transform the points and show the relationship
- Transformations need to be linked to functions from the start. Show what happens to the graph if x is translated 2 units left, what does it do to the formula etc.

GRADE 9 FOCUS

Probability should be taught in more detail.

- Correct language needs to be used
- **AND** and **OR** need to be explained and shown using real life relatable examples so that a solid understanding of the difference is developed
- Learners need to be encouraged to draw tree diagrams for all compound events

Geometry needs to be shown using hands on shapes

- Understanding of units and conversions of cube and square units needs to be visually represented
- Properties of shapes needs to be a focus
- Formulae need to be explained and developed on their own so that an understanding of WHY and WHAT they are doing is developed
- Parallel lines and perpendicular lines need to be focussed on and taught on a Cartesian plane. Link this to the formulae of vertical and horizontal lines and their gradients.
- Parallel lines and the angles they create need to be visualised rather than just accepted. Learners need to understand what happens if lines are NOT parallel and the importance of stipulating which lines are parallel
- The difference between proving lines parallel and using the fact that they are parallel to prove other facts needs to be accentuated
- Parallel lines and their properties should be used to teach the properties of quadrilaterals

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