ɔvince of the
ASTERN CAPE
)UCATION

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CURRICULUM INSTRUCTION G 03/2018

TO: **DEPUTY DIRECTOR-GENERAL**
CHIEF DIRECTORS
HEAD OFFICE DIRECTORS AND DISTRICT DIRECTORS
CHIEF EDUCATION SPECIALISTS
EDUCATION DEVELOPMENT OFFICERS
DEPUTY CHIEF/ SENIOR EDUCATION SPECIALISTS
PRINCIPALS OF PUBLIC AND INDEPENDENT SCHOOLS OFFERING GRADE 3, 6 & 9
TEACHER UNIONS/ORGANISATIONS
SCHOOL GOVERNING BODIES

DATE: **08 MARCH 2018**

GET 2017 COMMON EXAMINATIONS ANALYSIS OF RESULTS AND INTERVENTIONS FOR IMPROVEMENT.

1. In 2017 the Directorate GET administered a Common Examination for Grades 3, 6, 7 and 9 in Mathematics and Languages across all schools.

2. The objective of the Common Examination is to use a credible and standardised assessment that will assist the department to monitor the performance of the learners and to apply appropriate intervention strategies in especially Languages and Mathematics.

3. To this end a question by question analysis of items was conducted using a verified sample of the scripts.

4. Reports have been generated on emerging trends of how the learners performed as well as common errors and misconceptions that learners make in the two subjects.

5. The Provincial Framework for the Improvement of languages and mathematics attached identifies the areas in need of support and recommends strategies for improvement.

6. It is expected that the implementation of this framework will ensure that teachers target the key skills suggested in the framework to improve teaching and learning in languages and mathematics.

7. Schools are also encouraged to do an analysis of their own results and to develop Subject Improvement Plans from the findings.

8. All interventions must be done in line with the Annual Teaching Plan and the lesson plans and lesson trackers provided to schools.

9. All Subject Advisors are advised to support schools with the analysis of the results and the development and implementation of their subject improvement plans.

10. Targets for Grades 1-9 for all Subjects should be set based on the performance in November 2017 results.

11. Curriculum Managers and Subject Advisors are requested to mediate Curriculum Instruction G 03/2018 with teachers of GET Schools.

12. Principals are kindly requested to bring this notice to the attention of all the Languages and Mathematics teachers.

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MS. P. VINJEVOLD
DEPUTY DIRECTOR GENERAL: EPEM

Province of the

EASTERN CAPE

Department of Education

GRADE 6

MATHEMATICS FRAMEWORK FOR IMPROVEMENT IN 2018

GRADE 6 MATHEMATICS FRAMEWORK FOR IMPROVEMENT IN 2018

INTERMEDIATE PHASE (GRADES 4- 6): MATHEMATICS				
Topics Assessed: Numbers, Operations and Relationships				
Identified weaknesses Areas in need of support	**Remedial measures to improve classroom practice Strategies of improvement**	**Responsibility**		
		Province	**Districts**	**Schools**
Solving problems in context: 1. Learners' inability to understand concepts in the context. 2. challenge in answering some of the Complex and Problem Solving Questions appropriately. 3. Tendency by teachers marking learners correctly even if the answer is wrong. 4. Lack of knowledge or the content gap identified in teachers. Learners response have indicated that they could not make sense of the concepts in context. As a result, they couldn't approach Complex and Problem Solving Questions appropriately in most Content Areas. Teachers on the other hand	**Proposed interventions** • The steps below serve as a guide for learners when solving problems in context, as specified in the DBE JICA material. Learners should be encouraged to follow the steps below when solving problems in context (as specified in the DBE JICA material) o Read the problem with understanding o Circle all the numbers o Underline the question o Decide on the operation sign(s) to be used o Write the number sentence to illustrate the problem o Solve the problem.	The provincial office commits to: • Monitor district roll out workshops (Sasol Inzalo, Lesson Study) on DBE & Provincial Error Analysis. • Strengthen 'How I Teach'/Lesson Study sessions in districts for teachers to teach the concept.	Districts: • Should be guided by the JICA approaches when conducting workshops encompassing strategies on solving problems. Conduct a workshop involving strategies on solving word problems by utilising JICA approaches • Have to conduct the Information sharing sessions through "How I Teach" and Lesson Study workshops in different clusters • Encourage teachers to be creative thereby develop their own word problems and do self assessment. • Monitor and evaluate the extent of the work covered on fractions in	Schools are encouraged to: • Utilise the JICA material when solving the word problems. • Correct the use of Maths language as in English Across Curriculum (EAC), e.g. **sum** means add. • Make reference to the Maths dictionaries often. • Teach learners the Procedures of answering word problems. • Always refer to the DBE Workbooks to access additional activities. Use of DBE workbooks for more activities. • Utilise Provincial error analysis material. Reference should be made to the Grade 6 Error Analysis Resource Book: p.75 Refer to Grade 6 Error Analysis Resource Book pg. 75) guide • Teach learners and conduct activities on the Problem solving and Word sums. This should be ongoing but be consistently taught with all other CAs (write in full) throughout the year. • Collaborate often with the Language teachers to improve its language comprehension.

have shown some gap in such concepts hence sometimes they also marked learners correctly even if the learner's response is not correct.			both formal and informal tasks. • Reinforce the use of the CAPS document when preparing lessons.	
Addition and subtraction of mixed numbers • Addition and subtraction of fractions where denominators are multiples of one another is still a challenge to learners. Learners are able to add whole numbers but are unable to add and subtract fractions where denominators are multiples of one another. • Learners lack the concept of equivalence. • Inability to follow procedure when working out the problems, in the case where two operation signs are given, is also a matter of concern. They lack the concept of equivalence. They are also unable to work out the problems when two operation signs are given. They added the denominators and the numerators. Sometimes the answer is correct but the procedure followed	• Apply certain alternatives, like the use of practical demonstrations of fractions, using paper folding, diagrammatical representation and modelling of fractions. • For practise, learners should be carry out activities involving mixed numbers with more than one operation. More activities involving mixed numbers with more than 1 operation be given to learners for practise.	The Provincial office will undertake the following to assist Districts: • Monitor the roll out workshops on DBE error analysis. • Strengthen 'How I teach' and Lesson Study sessions to teach the concept.	Districts are expected to: • Conduct workshops involving strategies on addition and subtraction of mixed numbers using the Sasol Inzalo teaching and learning material.	Schools should continuously put the following into consideration: • Put emphasis on the meaning of a fraction. The meaning of a fraction should be emphasised. • The use of different tools to improve learner's approach to fractions. capacitate apparatus and diagrams to develop different ways of thinking about fractions should be enhanced. • Give out activities that address mixed fractions with more than one operation. given should also address the issue of mixed fractions with more than 1 operation. • To use both a fraction wall and the modelling approach. • Learners must be taught proper phases to follow, to make? the numerators or denominators the same through equivalence before comparing • The importance of the use of number line counting in fractions.

does not talk to the answer.				
Addition of whole numbers: • Inability to add whole numbers. • Lack of understanding of the place value. This was primarily based on the lack of understanding of place value. This was prevalent when learners were added or subtracted f from left to write (see learner 2 and 3)	Proposed interventions towards problems identified: • Use of Abacus by teachers to address the challenge of place value. teacher has to use abacus to address the challenge of place value • Numbers should first be written in words and thereafter familiarise learners to various methods of addition as specified in the CAPS document: pages 222 – 223 and SASOL Inzalo material. Practice writing numbers in words and expose the learners to various methods of addition as specified in the CAPS pages 222 – 223 and SASOL Inzalo material. (Refer to Grade 6 Error Analysis Resource Book pg. 4).	The Provincial office should: • Reinforce the 'How I Teach' and Lesson Study sessions in districts to teach the concept.	Districts are encouraged to: • Utilise the Provincial Error analysis material, workbooks and textbooks provided so as to address the problem. • Encourage collegiality among teachers so as to share best practices through 'How I teach' and Lesson Study Programmes.	• Refer to exercises in the workbooks, Provincial Error analysis. • Come up with appropriate strategies for learners to understand division as per the CAPS document/Sasol Inzalo resource material. Expose learners to appropriate methods of dealing with division as per CAPS document/Sasol Inzalo resource material.
Division of whole numbers: • Inability to divide whole numbers. • Lack of understanding of multiple facts of numbers	To capacitate learners how to: • Multiply any whole number by 10, 100 and 1 000 using clue board method. • Double and halve any number. • Master factors and multiples of whole numbers.	• The Provincial office encourage the use of 'How I teach' and Lesson Study sessions to teach the concept of?	District encouraged to: • Utilise the Provincial Error analysis material, workbooks and textbooks available to them to address the problem. • Encourage collegiality among teachers so as to share best practices through 'How I teach'	Schools should: • Utilise exercises from the workbooks, Provincial Error analysis??? • Expose learners to appropriate methods of dealing with division as per CAPS document/Sasol Inzalo material.

			and Lesson Study Programmes.	
Multiple operations • Learners unable to perform calculations involving multiple operations with or without brackets.	It is important for Learners to: • First identify the number of terms in the problem using the fact that the terms are separated by plus or minus sign. • Calculate on the either side of plus or minus sign. • understand that brackets mean multiply hence anything inside the brackets must be attempted first. • Operation sequence must be emphasized.	The Provincial office should: Strengthen 'How I teach' and Lesson Study sessions in districts to teach the concept.	Districts are encouraged to: • Utilise Provincial Error analysis material to address the problem • Encourage collegiality among teachers so as to share best practices through 'How I teach' and Lesson Study Programmes. • Encourage teachers to use the workbooks and textbooks	Schools/Learners are encouraged to: • Utilise exercises from the workbooks, Provincial Error analysis/Sasol Inzalo material • Identify the number of terms in the problem using the fact that the terms are separated by plus or minus sign • First do calculations on the either side of plus or minus sign. • Be made aware that brackets mean multiply hence anything inside the brackets must be attempted first. • Emphasise the Operation sequence.
Place value of decimal fractions • Learners could not identify the place value of decimals.	• Extend the place values to include tenths and hundredths.	The Provincial office should: • Strengthen 'How I teach' and Lesson Study sessions in districts to teach the concept.	Districts are obliged to: • Encourage collegiality among teachers so as to share best practices through 'How I teach' and Lesson Study sessions on the teaching of place values in the context of decimal fractions.	Schools should assist in: • The use of real life examples to develop the concept better (Use of money, distance, weights of objects). • Extending the place values to include tenths and hundredths.
Rounding off to the nearest 1 000. • Writing of a 4-digit number since 1 000 is a 4-digit number and leave out the other digits,	• Use a number line to teach rounding off, starting with small numbers so that learners can develop the rules for understanding how to round off	The Provincial office should: Strengthen 'How I teach' and Lesson Study sessions in districts to teach the concept.	Districts have to: • Encourage collegiality among teachers so as to share best practices through 'How I teach'	• Schools / Learners are advised to use Number line to teach the concept.

	number and then move to large numbers		and Lesson Study sessions on the teaching of place values in the context of decimal fractions.	
Patterns, Functions and Algebra				
Geometric patterns: • Extension of patterns without retaining the original structure, thus using numbers instead of structure of the pattern. • Inability to complete the table using the structure nor writing down the general rule for the pattern.	• Emphasise on the retainment of the original structure rather than just counting the shapes. • Use of number grid and identify different sets of numbers (multiples, odd numbers, even numbers, etc.), as the finding the general rule can be useful. • Learners must be made to observe the relationship between the position of the term (input values) and the term itself (output values). • Encourage learners to describe the pattern (rule) verbally. (Refer to Grade 6 Error Analysis Resource Book pg. 176).	• Monitor the district roll out workshops on DBE error analysis The Provincial office should: • Strengthen 'How I teach' and Lesson Study sessions in districts to teach the concept.	Ensure that geometric patterns are better understood and original structures are maintained.	• Use of DBE workbooks and other resource books for more activities. The School/Learner • Activities that address the concepts should be at different levels • Practical demonstrations conducted have to culminate into numeric patterns i.e. Use of concrete objects or material (manipulative) in order to extend the pattern. • The concept should be addressed as per CAPS document.
Space and Shape (Geometry)				
Enlarging a shape	• Expose learners to activities that lead to the understanding of the meaning of reduction,	The Province should: Strengthen 'How I teach' and Lesson Study sessions in	Districts have to: • Encourage collegiality among teachers so as	Schools / Learners have to conduct practical demonstrations using grid papers.

• Limited understanding of question 19 in terms of enlargement of the shape.	enlargement and scale factor. • Teach learners to investigate the effect of enlargement on the area of the shape.	districts to teach the concept.	to share best practices through 'How I teach' and Lesson Study sessions on the teaching of place values in the context of decimal fractions.	
3-D objects. • Inability to identify the net which forms a square- based pyramid.	• Teachers have to bring real objects, allow learners to cut out the objects and then draw the cut-out objects to form the nets.	The Province has to: Strengthen 'How I teach' and Lesson Study sessions in districts to teach the concept.	Districts are encouraged to: • Utilise Provincial Error analysis material to address the problem. • Encourage collegiality among teachers so as to share best practices through 'How I teach' and Lesson Study Programmes. • Encourage teachers to use the workbooks and textbooks.	• Schools have to use of activities from various resource books as mentioned before.
Position and movement: • A total number of (be specific) Many learners could not make sense of direction from the scenario given.	• Schools are advised to expose learners to various forms of questions that include position and movement other than identifying the cell for the position of an object.	The Province has to :Strengthen 'How I teach'and Lesson Study sessions in districts to teach the concept.	Districts have to: • Utilise Provincial Error analysis material to address the problem • Encourage collegiality among teachers so as to share best practices through 'How I teach' and Lesson Study Programmes. • Encourage teachers to use the workbooks and textbooks.	Schools / Learners are encouraged to: • Expose learners to various forms of questions that include position and movement other than identifying the cell for the position of an object. • Utilise Provincial Error analysis material to address the problem identified.

Problem solving (non-routine or unseen) • Inability to count the total number of triangles.	• Introduce learners to complex diagrams instead of giving them a single 2-D shape • Counting the number of 2-D shapes must be developmental, whereby each learner starts with one shape, and add other shapes in order to recognise the pattern.	The Province should: Strengthen 'How I teach' and Lesson Study sessions in districts to teach the concept.	The Districts should: • Utilise Provincial Error analysis material to address the problem • Encourage collegiality among teachers so as to share best practices through 'How I teach' and Lesson Study Programmes.	Schools / Learners are advised to: • Expose learners to complex diagrams instead of giving them a single 2-D shape • Counting the number of 2-D shapes must be developmental, whereby you start with one shape, and add other shapes in order to recognise the pattern.
Measurement				
Time • Learners could not calculate the time difference between the two given countries. • Learners inability to to read the analogue time.	Teachers are advised to: • Bring real clocks in class for learners to manipulate the arms of the clock • Emphasise on the time zones maps in the classroom, so that learners must understand the different time zones. • Put emphasis on analogue time is as important as digital. • Make learners understand that the terminology involved in measurement of time must be accentuated. •Learners must be taught that the country situated on the right side is always ahead on the country on the left.	• Monitor district roll out workshops (Sasol Inzalo, Lesson Study) on DBE & Provincial error analysis • Strengthen 'How I teach' sessions in districts to teach the concept.	Strengthen 'How I teach' and Lesson Study sessions in clusters to teach the concept.	• Concrete objects be used showing analogue and digital time and also the map of the world. • Practical demonstrations and use of number line to address the concept are crucial. • Various resources (workbooks, textbooks, Error Analysis & Sasol Inzalo documents,) be used to extend the scope of understanding

Capacity/Volume • Non-differentiation of terms: volume with capacity.	Teacher should: • Use of concrete objects/material when teaching the section to emphasise on the understanding of capacity as opposed to the volume. • Use different calibrated containers to show how many millilitres make a litre.	The Province should: • Monitor district roll out workshops (Sasol Inzalo, Lesson Study) on DBE & Provincial error analysis. • Strengthen 'How I teach' sessions in districts to teach the concept.	Districts have to: Strengthen 'How teach' and Lesson Study sessions in clusters to teach the concept.	Schools have an obligation to: • Use of concrete objects is also vital to when addressing the concept. • Conversion of units be revisited either from the smallest to the biggest or the other way round vice-versa.
Data Handling				
Interpreting graphs • Unable to respond to questions placed on the pie chart.	• Teach fractions to help learners understand a Pie Chart. • Understand that fractions must be simplified first before expressing them as fractions • In order to express fractions as percentage, the denominator must always be 100, or a percentage is a hundredth.	• Monitor district roll out workshops (Sasol Inzalo, Lesson Study) on DBE & Provincial error analysis • Strengthen 'How I teach' and Lesson Study sessions in clusters to teach the concept.	Districts should: • Strengthen 'How I teach' sessions in clusters to teach the concept • Provide on-site classroom support to teachers.	Schools should: • Expose learners to different types of graphs which they have to analyse especially pie charts. • Teach the concept percentage and fractions and not to address it only in Numbers, Operations and Relationships.
Probability • Learners could not determine the probability of getting a 6 when a dice is thrown.	• Learners must be taught that probability is a chance that something can happen and is always written as a fraction. • Teaching probability must be done practically, e.g. throwing a dice, spinning a spinner, tossing a coin, etc.	Strengthen 'How I teach' and Lesson Study sessions in clusters to teach the concept.	Districts should: • Strengthen 'How I teach' sessions in clusters to teach the concept • Provide on-site classroom support to teachers.	Schools / Teachers have to understand that: • concrete material has to be used (coin, dice, playing cards, counters) in the classroom. • Probability is always written in fractional form and that has to be emphasised.

Province of the

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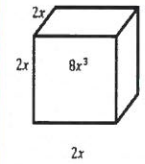
Department of Education

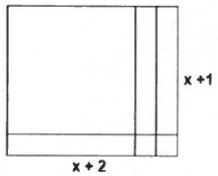
GRADE 9

MATHEMATICS FRAMEWORK FOR IMPROVEMENT IN 2018

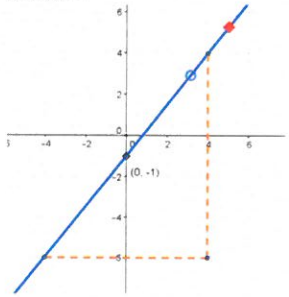
MATHEMATICS FRAMEWORK FOR IMPROVEMENT GRADE 9

SENIOR PHASE (GRADE7- 9): MATHEMATICS				
TOPICS ASSESSED: NUMBERS, OPERATIONS AND RELATIONSHIPS				
Identified weaknesses AREAS IN NEED OF SUPPORT	**Remedial measures to improve classroom practice**	**Responsibility**		
		Province	Districts	Schools
Compound interest 1. Calculations on compound interest. 2. Differentiate between the formula for compound interest with the simple interest.	Proposed Interventions: • The teaching of word problems should be done systematically to enhance learners' ability to interpret, understand, select critical information and use that information to calculate the answer. • On introduction of the Compound interest, learners should manipulate the formula for different variables be made subject of the formula. • Start with the substitution of the given unknowns to avoid confusion.	• Monitor and district roll out workshops on DBE error analysis. • Strengthen 'How I Teach' sessions in districts through Provincial programmes like NECT and JICA to teach the concept • Monitor curriculum implementation, content coverage and workbook utilization in districts. • Use of SASOL INZALO textbook to boost teachers' Content knowledge and Pedagogical Content Knowledge.	• Establish PLCs to strengthen team work amongst teachers. • Conduct workshops on financial mathematics. • Monitor curriculum implementation, content coverage and workbook utilization in schools. • Encourage information sharing sessions in financial mathematics through PLCs and 'How I Teach' sessions. • Administration of common tasks on the topic to acquaint learners with the questioning style.	• Teach word problems systematically to enhance learners' ability to interpret, understand, select critical information and use that information to calculate the answer. • Encourage learners to change the subject of the formula in order to calculate A, P, N, R and I. • Ensure the maximum and effective use of DBE workbooks and Sasol Inzalo textbooks daily.
		• Support subject advisors during provincial meetings. • Monitor curriculum implementation throughout the year.		

Simplification of algebraic expressions 1. Learners showed lack of understanding of the concept: simplification of the algebraic expressions. For an example, those involving • Square roots of single or like algebraic terms with decimals; • Squaring of a binomial and the product of two binomials. • Applying laws of exponents to simplify algebraic expressions.	**Proposed Interventions**: • Revise multiplication of binomials by monomials and also exponential laws. • Teach the concept of factors thoroughly to include expressions. • Teach like terms starting from concrete objects to variables. • Convert decimal fractions to common fractions before simplification.	The Provincial office commits to: • Support Subject Advisors during provincial meetings. • Monitor curriculum implementation.	Districts: • Should continue workshops and monitoring, including support in teaching the area concerned.	• Revise the multiplication of 2-digit number by a 1- digit number and a 2-digit number by a 2-digit number as the basis for simplification of algebraic expressions. • Learners must show and explain the steps taken for them to get to the answer. • Cover these topics with integers, then progress to algebraic terms and expressions later. • Use the process of calculating the area of squares and rectangles to introduce simplification of algebraic expressions. • Extended to cubes and algebraic terms. Here, $8x^3$ represents the volume of the cube and $2x$ (cube root of $8x^3$) is represented by the length of each side edge. 

Factorisation • Lack of understanding of the processes involved in factorisation.	**Proposed Interventions**: • Methodically teach the sequence of steps used in factorisation. • Make learners aware that simplification of expressions and factorisation of expressions are reverse processes. • Effectively, factorisation of an expression is writing the expression as a single term.	**The Provincial Office will assist Districts and Schools using the following criteria**: • Monitoring of the district roll out workshops on DBE error analysis, lesson study and JICA programmes. • Strengthening the PLCs and 'How I Teach' sessions supporting districts in teaching the concept. • Supporting the subject advisors during the provincial meetings. • Monitor curriculum coverage and implementation of CAPS throughout the year.	**Districts will have to**: • Conduct workshops for teachers to address the effective teaching and learning of factorisation. • Monitor that the concepts and the Provincial analysis findings are implemented at the classroom level, through lesson study programme. • Monitor curriculum coverage through NECT programmes.	**Schools:** **The following serve as a guide for teachers to teach the steps used in factorisation**: • Start by checking for a common factor; and/or • if the expression has two terms check if difference of two squares can be used; • Teachers must guard against statements such as ,' **take out'** the common factor which may lead learners to subtract the common difference e.g. $\mathbf{2(x^2 + 4x - 34)}$ • It is recommended that **mixed** examples of difference between squares be given to emphasise and master the concept. For an example, if the expression has 3 terms factorise a trinomial. • If the expression has 4 terms use grouping of terms and factor out common factors. • Make learners aware that simplification of expressions and factorisation of expressions are reverse processes. • Effectively, factorisation of an expression is writing the expression as a single term: **Example**: • $2x^2 + 6x - 36 = 2(x + 6)(x - 3)$ 3 terms 1 term • Teachers should use squares and rectangles to visualise factorisation.  $x^2 + 3x + 2 = (x + 2)(x + 1)$

Algebraic Equations	**Proposed Interventions**:	**Province:**	**Districts:**	**Schools are encouraged to**:
• A limited understanding in solving equation involving fractions. For an example: Inability to: ➢ Identify LCM. ➢ Fully cross multiply (not multiplying the whole term) ➢ Inability to solve exponential equations. ➢ Not knowing to factorise trinomials • Inability to solve word problems	• Conduct and In-depth training to assist teachers and learners as suggested below: - Revise the laws of exponents. - Revise the concept of LCM. - Revise factorisation of the difference of two squares. - Emphasis on Factorisation as an inverse of the product and vice versa should be done. - Teaching of operations in the context of exponents.	• Conduct a workshop to provide knowledge and skills regarding the teaching of **integers** and **equations,** to all subject advisors in the province, during the scheduled curriculum meetings between provincial coordinators and subject advisors in the province.	• Conduct focused workshops for teachers to address the effective teaching and learning of **integers** and **equations**. • Emphasise the multiplicative identity property of numbers and additive identity property of numbers • Use DBE workbooks to enable teachers to use them to teach integers and solving equations.	• First teach integers before teaching equations for learners, to acquire the requisite knowledge and skills of solution of equations. • Teach addition and subtraction of integers simultaneously to demonstrate the concept of additive inverses. Do the same with multiplication and division to demonstrate multiplicative inverses. • Initially, when solving algebraic equations, learners must be encouraged to solve it by inspection and to check solutions by substitution $\frac{2(x+3)}{16} = 5$ $6x + 6 = 80$ $\therefore x = 37$ • Learners must have enough practice in factorising and simplifying expressions including squares of binomials in order to solve equations of the following type: $(x-2)^2 + 3x - 2 = (x+3)^2$ and $x^2 - 5x - 6 = 0$ • Use the DBE and SASOL Inzalo workbooks to enable learners to do more practice exercises on integers and solving equations.

Straight Line Graphs: A number of learners were unable to: • Answer questions based on graphs. • Understand which steps to follow when finding the equation of a line, given two sets of points. • To draw linear graphs from given equations.	**Proposed Interventions**: • Teaching the gradient properly and give more exercises to master the concept. • Teach to identify the important features e.g. the gradient, x and y-intercepts • Revise use of tables or ordered pairs to plot points and draw graphs on the Cartesian plane. • Demonstrate and teach the drawing of graphs. • Provide learners with the already drawn graphs and teach them to identify the important features e.g. the gradient, x and y-intercepts.	**The provincial office commits to**: • Support subject advisors by conducting focused workshops on the use of ICT (GeoGebra, SketchPad, etc…) in this regard.	**Districts:** • Should conduct more workshops on this topic. • Must encourage the use of ICTs (dynamic software such as GeoGebra) to teach or consolidate concepts. • See GeoGebra diagram below:  	**Schools:** • Teachers must use the idea that the gradient equals the vertical distance between two points on a line divided by the horizontal difference between them, practically using the graph paper and ruler. • Learners should be encouraged to repeat this process between any other points on the line in order to discover that the gradient between any TWO points is exactly the same. • Teachers must design investigations that will highlight the relationships between the line graph, its gradient and y-intercept with the coefficient of x and the constant term respectively in the equation $y = mx + c$

SPACE AND SHAPE (GEOMETRY)				
Straight line geometry -Inability to solve geometric problems using relationships between pairs of angles, formed by parallel lines cut by a transversal line.	**Proposed Interventions**: The following serves as a guide for teachers and learners: • Understand a straight line geometry to help with proficiency in dealing with problems involving congruency and similarity. • Learners should discover the relationship between pairs of angles formed by parallel lines cut by a transversal line, by measuring the angles and thereafter colour equal angles with the same colour, to identify their position on the lines and generalise. • The teacher should then introduce the necessary vocabulary involved and there after learners should be allowed to prove their conjecture through tracing method. • Use practical approach whenever possible e.g. paper folding and investigative methods to generate a general rule.	**The Provincial office**: • Monitor the district roll out workshops on DBE error analysis. • Strengthen 'How I each' sessions in districts to teach the concept. • Monitoring and support to ensure curriculum coverage.	**Districts:** • Should conduct Straight Line Geometry workshops with teachers, and advise them to teach straight line geometry thoroughly in Grades 7 and 8 to maximise learner performance in Grade 9. • Introduce the development of geometric concepts through the use of dynamic software. (GeoGebra, SketchPad, etc...)	**Schools:** Should ensure that learners: • Master relationships between pairs of angles. • Emphasise different symbols used to denote parallel lines and equal lines. • Ensure that learners are capable of solving algebraic equations in order to solve geometry problems.
Triangles: Congruency and Similarity. **Learners**: • show limited understanding of the concept of congruency and similarity.	**Proposed Interventions**: • Expose learners to congruent and similar figures in real life situation. • Teach definitions of congruent and similar figures with examples. • Emphasise that congruency or similarity involves comparing the	**The provincial office commits to**: • Ensure that all schools have textbooks, workbooks and CAPS. • Strengthen monitoring and support for districts and schools.	**Districts:** • Conduct workshops to address teaching strategies for Geometry. • Introduce the development of geometric concepts through the use of dynamic software. (GeoGebra, Sketch Pad, etc...)	**Schools:** • Have to clearly distinguish between similarity and congruency, in order to mitigate any confusion between the two concepts. • Should use a construction method so that learners can investigate the conditions of congruency and similarity.

• Give correct axiom of similarity as a reason where there is no logic followed. • Give incorrect axiom for congruency **Some learners are:** • Unable to name angles. • Cannot Solve for the unknown using properties of triangles. • Doubt as to which two angles in a triangle add up to exterior angles of a triangle. • Cannot identify the position of an exterior angle in a triangle.	sides or angles of two triangles and not only one triangle. • Learners should discover the relationship between the exterior angle of a triangle and its interior angles • Clarify to learners the importance of naming angles in Geometry correctly. • Revise straight line geometry • Enhance conceptual understanding of congruency and similarity. • Link similarity with the concept of enlargement in the previous grades.		• There is a need for support to teachers during school visits, on how to structure assessment to cater for different cognitive levels, including questions that require learners to justify their answers. • Are required to strengthen monitoring and support of schools.	• Have a responsibility of teaching learners to identify the figure in which they are working on, using colours as means of differentiation/highlighting. • Are required to expose learners to different levels of questions, especially those that require problem solving and complex procedures.

MEASUREMENT				
Perimeter and Area of 2-D shapes. • Inability to calculate the area of the shaded part in complex figures. • Do not understand the formulae for area of polygons.	**Proposed Interventions**: • The Area of 2-D shapes should be taught in a very practical way, using square cut-outs, measuring instruments etcetera. • Learners should: ➢ know the different types of polygons by comparing and contrasting their properties. ➢ also discover the formulae for different polygons through investigation. ➢ explore how doubling of any or all of the dimensions of a 2-D figure affects its perimeter and its area, then generalise.	**The Provincial office encourage:** • Conducting and monitor of the district roll out workshops on DBE error analysis. • Strengthen 'How I Teach' sessions in districts to teach the concept. • Ensure that subject advisors are familiar with the content that addresses perimeter and area in CAPS.	**Districts should**: • Conduct workshops to address area of 2-D shapes. • Support teachers through school visits. • Introduce the development of geometric concepts through the use of dynamic software. (GeoGebra, SketchPad, interactive whiteboards etc...)	• The teaching of area of an ordinary 2D shape should immediately be followed by the teaching of the surface area of triangular prisms (3D objects). • Emphasise the use of nets when calculating the surface area of a triangular prism. • Use appropriate formulae to calculate area, surface area and volume.

DATA HANDLING				
Areas of concern • A large number of learners still need assistance in this Content Area. • Inability by some learners to draw a tree diagram. • Learners still struggle in differentiating between two way tables and a tree diagrams.	**It is important to**: • Understand the basics and terminology in probability. • Extend the experiments to compound events • Teach the two way tables and tree diagrams simultaneously from simple to complex experiments.	**The Provincial office has to**: • Strengthen the use of DBE workbooks during the annual review. • Monitor the curriculum implementation, content coverage and workbook utilization in districts. • Monitor the district roll out workshops on DBE error analysis. • Strengthen 'How I Teach' sessions in districts to teach the concept. • Mediate the findings of the Diagnostic Report with districts and schools. • Analyse the provincial plans and provide guidance on how to alleviate the identified weaknesses. • Monitor and support the districts and cluster interventions. • Strengthen the Sasol-Inzalo teacher's guide to comprehensively address the identified weaknesses. • Develop the provincial improvement plans that are implementable. • Address the weaknesses identified and share with districts for implementation. • Mediate the report (and the provincial plans) with the SAs.	**Districts are encouraged to**: • Conduct workshops to address Probability. • Strengthen PLCs - Information sharing sessions through "How I Teach" workshops on probability in different clusters must be encouraged. • Encourage Lesson Study sessions to address the identified weaknesses. • Ensure that the Diagnostic report is mediated with all schools. • Monitor the utilisation of the findings of the report, and progress of the improvement of teacher competency through the post-tests and/or worksheets. • Develop district improvement plans that are implementable and directly address the weaknesses identified and share with schools.	**Schools are encouraged to**: • Revise the basic concepts, for an example, probability scale, possible outcomes, relative frequency, etc. • Use practical experiments for both single and compound events, for an example, tossing coins, throwing dice, different coloured counters, spinners etc. • Teach the two way tables and tree diagrams simultaneously. • Refer to the DBE workbooks throughout. • Carefully plan activities to address the weaknesses during How I Teach and Lesson Study Cluster sessions. • Teach learners a systematic way of solving problems in context: read with understanding; translate the problem into mathematical language; solve the problem mathematically; translate the answer into the original context and verify the answer. • Invest time in finding connections between topics, for an example: factorisation in solving equations; common fractions and exponential laws in algebraic expressions, etc. • Develop the school improvement improvement plans that are implementable and directly address the weaknesses identified and share with PLCs.

Province of the

EASTERN CAPE

Department of Education

GRADE 3

MATHEMATICS FRAMEWORK FOR IMPROVEMENT IN 2018

EASTERN CAPE GRADE 3 MATHEMATICS FRAMEWORK

FOUNDATION PHASE (GRADES 3): MATHEMATICS				
Numbers, Operations and Relationships				
Identified weaknesses	**Remedial measures to improve classroom practice**	**Responsibility**		
		Province	**District**	**School**
Number sentence: Learners have difficulty in breaking down the numbers into smaller parts, to use the relationship between addition and subtraction and to determine the value of the place holder.	1. Teachers should provide learners with different activities to do number sentences where more than one operation is used. 2. Learners need to work in small groups to break down (decompose) numbers, re-organise the parts and recombine them to perform the calculation and/or to solve a problem e.g. 66 + 28. • Break down the numbers 60 +6 and 20 + 8 and then uses the knowledge of combinations of single-digit numbers 6+8=14 and combinations of multiples of ten (60+20=80) as tools for determining 94 as the answer.	1. Strengthen the implementation of the Lesson Study method. 2. Use of Mathematics NECT Learning Programme. 3. Utilisation of the Error Analysis & Mathematics Handbook. 4. Ensure the implementation of 'How I teach sessions in districts to teach the concept.	1. Roll out the Mathematics NECT Learning Programmes, monitor the implementation of Lesson Study and Error Analysis. 2. Conduct Information sharing sessions through "How I Teach" and Lesson Study workshops in different clusters	The SMT must monitor the: 1. Utilisation of DBE workbooks, Error analysis and Learning Programmes. 2. Expose learners to appropriate strategies of dealing with addition and subtraction as per CAPS document. 3. Ensure teacher's attendance during the "How I teach Programmes" at circuit level

Addition and subtraction Learners were unable to decompose numbers, re-organise the parts and recombine them to perform a calculation to solve the subtraction problem. Challenge with number value.	1. Consolidate knowledge of place value using place value cards & flard cards in breaking down and building up of numbers 2. Give examples of subtraction problems and get learners to use the place value cards to solve the problem e.g. 595 – 247=□ 3. Write the number sentence each time to show the breaking down & building up strategy. 4. Provide opportunities to help learners think of various ways to break down, re-organise and build up numbers e.g. using picture cards/dot cards and posing questions, such as make as many pairs of numbers that make 20, make the number 12 using two numbers, using three numbers etc. 5. Get learners to build two-digit and then proceed to three-digit numbers using different ways.	1. Monitor the utilisation of DBE and Provincial guideline documents e.g. Mathematical Proficiency in developing fluency in multiplication& division 2. Monitor the Implementation of Lesson Study Sessions	1. To ensure that the provided resources are used effectively 2. Provide support to teachers through workshops to solve the problem 3. Use of ANA Exemplars 4. Organise Lesson Study Sessions in districts	1. Utilise exercises from DBE workbooks, Provincial Error analysis 2. Expose learners to appropriate methods of dealing with addition and subtraction as per CAPS document 3. Use of Mathematics NECT Learning Programme (Term 1 Lesson Plan Booklet pg 45 wk 4)

Number Line Learners were unable to construct their own number line and break it up into manageable parts. Unable to count on in efficient intervals in relation to the value of the number.	1. Give learners multiple opportunities to solve number problems on a number line. 2. Progress to number lines that vary in number ranges and increase intervals e.g. ones, fives, tens, hundreds, etc. 3. Allow learners to practice: - counting on from a given number. - find the number bigger than or smaller than. 4. Leaners can use their fingers or counters to show the jumps on the number line. 5. Provide learners with a number problem and get them to draw the jumps on a blank number line. Learners explain their solution or answer	1. Monitor the Implementation of Lesson Study Sessions	1. Provide support for teachers through workshops on solving problems using number lines. 2. Use of ANA Exemplars. 3. Organise Lesson Study sessions in districts & monitor the utilisation of DBE and provincial resources. 4. Reinforce the use of Mathematics CAPS document	The SMT must monitor and ensure the: 1. Utilisation of DBE workbooks, Provincial Error analysis. 2. Expose learners to appropriate methods of dealing with number line as per CAPS document and Mathematics NECT Learning Programme (Term 1 Maths Lesson Plan Booklet wk 3 Lesson 8, wk 4 Lesson 9)

Number Patterns and Functions				
Identified weaknesses	**Remedial measures to improve classroom practice**	**Responsibility**		
		Province	**District**	**School**
Number pattern Learners were unable to answer the number patterns	1. Use of concrete objects. 2. Allow learners to investigate and extend a variety of numeric patterns involving constant difference or ratio. 3. Allow learners to create their own numeric patterns and describe them in their own words. 4. Fill in missing numbers on a number line or blank number chart. Show learners that a number pattern can be identified by subtracting the first two numbers in a pattern to determine the constant difference.	1. Utilisation of DBE Error Analysis material to address the problem. 2. Conduct content Gap workshops	1. Monitor utilization of DBE workbooks, Lesson Programmes and provincial resources, (Mathematical Proficiency, developing fluency in multiplication and division, Mathematics Hand book and DVD). 2. Conduct content gap workshops for teachers.	1. Teachers must ensure that they expose learners in variety activities on number patterns that are in CAPS Document, Maths Lesson Plans Term 1 pg. 129-135 week 11. 2. Make use of DBE Workbooks

Measurement				
Identified weaknesses	**Remedial measures to improve classroom practice**	**Responsibility**		
		Province	**District**	**School**
Time Learners were unable to adequately respond to questions on Time. They could not differentiate between time in hours, half hours, quarter hours and minutes and could not relate time in words.	1. Allow learners to tell the time at regular intervals on almost a daily basis in hours, half hours and quarter hours using an analogue clock. 2. Learners can be asked to tell the time when school starts, at break time, home time and include some calculations of elapsed time from one event to another. 3. Display a large digital/analogue clock in the class for learners to refer to. 4. Get learners to make their own model clocks or provide them with these and allow them to show various times and include calculations of	1. Strengthening *How I teach.* 2. Utilisation of Error Analysis material to address the problem. 3. Ensure that learners are proficient in in multiplication and division.	1. Concept to be presented during How I teach Programme, JICA Lesson Study. 2. Monitor the utilisation of DBE and Provincial resources such as Proficiency in developing fluency in multiplication and division, error analysis. 3. Use of ANA exemplars to practice the answering of questions.	1. SMT members must ensure that resources like watches are provided in each class. 2. Learners should make their own clocks using waste material. 3. Learners to be given practical activities using clocks. 4. Teachers should refer to Lesson Plans Term 1 pg. 120-123. 5. Utilize DBE Workbooks wk sheet 32 pg. 74 & 75

	elapsed time from one to another. 5. Estimate time differences between events.			
Calendar Learners were unable to calculate and describe lengths of time in days or weeks or months	Learners should be exposed to the following activities: 1. Get learners to frequently work with weeks or days using a calendar or a section of a calendar, e.g. finding today's date, tomorrow's date, the date a week ago and calculating the days or weeks between events. 2. Learners can be asked to tell the day and or date of when school starts, when school breaks for holidays and include some calculations of elapsed time from one event to another. 3. To work in small groups, independently and calculate weeks or days	1. Utilisation of Provincial Error Analysis to address the problem	1. Monitor the utilisation of DBE and Provincial resources such as Error analysis, Lesson Plans	1. Provision of current year calendar in each class. 2. Availability of Birthday chart in each class. 3. Expose learners in variety activities on calendar. 4. Utilisation of Mathematics NECT Lesson Plans Term 1Lesso 34-week 10 pg. 117 and DBE Worksheet no12 pg. 26&27

	using a calendar or a section of a calendar, e.g. finding dates and calculating the time differences between them. 4. Consolidate the language of ordering and comparing e.g. between, before, after, etc.			
Mass Struggling to record mass	1. Help learners understand mass by involving them in informal measuring activities such as: • Estimate, measure and compare mass using labelled measuring containers and record the measurements. • Discuss findings • Read the number on the gradation line • Describe the mass in grams and kilograms. 2. Practice word problems involving grams and kilograms	1. Monitor the Implementation Lesson Study Sessions. 2. Conduct workshop on content gap	1. Roll out all DBE and Provincial Programmes. 2. Provide opportunities for professional gathering to share best practices e.g. during Lesson Study sessions. 3. Monitor the utilisation of DBE and provincial resources	1. Use of practical activities in the classroom using waste material collected by learners. 2. Utilisation of DBE Workbooks and other resources such as Error analysis, Numeracy Handbook and Lesson Plans Term1

Data handling				
Identified weaknesses	**Remedial measures to improve classroom practice**	**Responsibility**		
		Province	**District**	**Schools**
Graphs Learners were unable to interpret the graphs as well as the instruction when calculating the final answer	1. Teaching of data handling starts in Grade 1 and 2 where learners are expected to work with pictographs. 2. In Grade 3 learners are expected to work with bar graphs. This progression from grade 1 to grade 3 must therefore be monitored. 3. Explain the layout of a bar graph to learners using different examples. 4. Provide learners with practice in answering questions on different graphs. Do this in small groups both orally and written. 5. Use graphs with varied intervals on the vertical axis. 6. Expose learners to the correct mathematical vocabulary such as more than, most, least, equal,	1. Ensure that How I teach Programmes, and Learning Programme are roll out in the districts. 2. Monitor the Implementation of Lesson Study Sessions . 3. Conduct workshop on content gap	1. Provide opportunities for professional gathering to share best practices e.g. 'How to teach'. 2. Circuit Leaders conduct 'How I Teach' and 'Lesson Study' Sessions with their grouping of schools on topics identified as challenging. 3. Encourage teachers to make use of innovative ideas and worksheets from different websites such as Pinterest, sparkle box, etc. 4. Conduct school visits to monitor progress. 5. Report progress to the SMT.	1. HODs, Grade Heads and Subject Heads conduct demonstration lessons during phase and grade meetings. 2. HODs, Grade Heads and Subject Heads monitor lesson planning as part of internal moderation process. 3. Teachers: Refine lesson activities and teaching strategies using the DBE and Provincial resources such as, Maths Lesson Plans week 7 pg.78-83 Numeracy Handbook unit 9 pg. 135-147.