



Province of the
EASTERN CAPE
DEPARTMENT OF EDUCATION

MATHEMATICS

EXEMPLAR LESSON PLANS ON
GRADE 12

Attached herewith, please find suggested lesson plans for term 1 of MATHEMATICS Grade 12.

Please note that these lesson plans are to be used only as a guide and teachers are encouraged to develop their own learner activities to supplement and/or substitute some of the activities given here (depending on the school environment, number and type of learners in your class, the resources available to your learners, etc).

Lesson planning is a necessary exercise for each and every individual teacher however it helps when teachers sometimes plan together as a group. This interaction not only help teachers to understand how to apply the Learning Outcomes (LOs) and Assessment Standards (ASs) but also build up the confidence of the of teachers in handling the content using new teaching strategies.

The Learning Outcomes for the other subjects with which one can integrate have not been identified. The other subjects with which possible integration can be made have been listed. The Lesson plan could therefore change if the other subject/s, their LOs and Ass could be clearly stated. Do not forget to build in the tasks for the Programme of Assessment into your Lesson Plans.

Strengthen your efforts by supporting each other in clusters and share ideas.

Good Luck with your endeavors to improve Teaching, Learning and Assessment.

LESSON PLAN: 1

Subject: MATHEMATICS		Grade 12	
Lesson Plan: NUMBER PATTERNS		Number of Activities 3	
Duration: 4h30		Week 1-3 Date	
Context: Mathematical : Sequences and series			
Link with previous lesson: Grade 10-11 Number patterns			
KNOWLEDGE (K): Arithmetic and geometric sequences SKILLS (S): Calculate and interpret VALUES (V): Appreciation , respect			
	ACTIVITY 1	ACTIVITY 2	ACTIVITY 3
Activity Content	Arithmetic and geometric sequences	Sigma notation	Sum of series
LO,s and AS's	LO 1 AS 12.1.3. a, b, c.	LO 1 AS 12.1.3. a, b, c.	LO 1 AS 12.1.3. a, b, c.
Detail of Activity	<p>Learners given worksheets to clearly identify and solve problems involving number patterns, including but not limited to arithmetic and geometric sequences and series. They should make links clearly links between patterns done in grade 10-11 so that for example, learners understand that an arithmetic sequence is a linear pattern and a geometric sequence is an exponential pattern.</p> <p>Calculate the term value and the number of terms in a sequence of any pattern.</p>	<p>Educator gives worksheet so that learners Correctly interpret sigma notation and convert fluently between Σ notation and expanded notation.</p>	<p>Prove and correctly select the formula for and calculate the sum of series, including:</p> $\sum_{i=1}^n 1 = n ;$ $\sum_{i=1}^n i = \frac{n(n+1)}{2} ;$ $\sum_{i=1}^n a + (i-1)d = \frac{n}{2} [2a + (n-1)d]$ $\sum_{i=1}^n a.r^{i-1} = \frac{a(r^n - 1)}{r - 1}; r \neq 1$ $\sum_{i=1}^{\infty} a.r^{i-1} = \frac{a}{1-r} \text{ for } -1 < r < 1$
Teaching Methods	Question and answer	Question and answer	Discussion, question and answer
Assessment Strategy :Form : Tool :Method	Class work home work Memo Educator, group	Class work home work Memo Educator, individual, peer	Class work, home work , test Memo Educator, group
Expanded Opportunities:	Different examples and remedial work Use of different equations		
Resources	Work sheets, calculator, Charts , textbook		

Teacher reflection			
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LESSON PLAN:2

Subject: MATHEMATICS		Grade 12	
Lesson Plan: FUNCTIONS, INVERSES AND LOGARITHMS		Number of Activities 3	
Duration: 4h30		Week 4-5 Date	
Context: Mathematical : FUNCTIONS, INVERSES AND LOGARITHMS			
Link with previous lesson: Functions , sequences and series			
KNOWLEDGE (K): Logarithms, functions, inverse relations			
SKILLS (S): Investigate, discover, demonstrate, calculate, problem solving, drawing VALUES (V):Appreciation			
	ACTIVITY 1	ACTIVITY 2	ACTIVITY 3
Activity Content	Logarithms	Types of functions	Graphs of inverse relations
LO,s and AS's	LO1.AS 12.1.2	LO2 AS12.1,2,3	LO2 AS12.1,2,3
Detail of Activity	<p>Learners given worksheets to demonstrate an understanding of the definition of a logarithm and any laws needed to solve real-life problems (Definition of a logarithm – understand that the logarithmic function is the inverse of the exponential function.</p> <p>Learners need to convert fluently between logarithmic form and exponential form.</p> <p>Note: Solving logarithm equations and inequalities must be seen in the context of functions.</p>	<p>Learners demonstrate the ability to work with various types of functions and relations including the inverses listed in the following Assessment Standard. Demonstrate knowledge of the formal definition of a function.</p> <ul style="list-style-type: none">Given the relationship between x and y in<ul style="list-style-type: none">a set of graphstableswordsalgebraic formulae <p>Determine whether the given information represents a function.</p>	<p>Learners draw graphs of the inverse relations, of functions, in particular the inverse of:</p> $y = ax + q ; y = ax^2 ; y = a^x ; a > 0:$
Teaching Methods	question and answer	Question and answer	Discussion, question and answer
Assessment Strategy :Form : Tool :Method	Class work home work Memo Educator, group	Class work home work Memo Educator, individual, peer	Class work, home work , test Memo Educator, group
Expanded Opportunities:	Different examples and remedial work Use of different equations		
Resources	Work sheets, calculator, Charts , textbook		

Teacher reflection			
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LESSON PLAN: 3

Subject: MATHEMATICS			Grade 12
Lesson Plan: Functions and inverses			Number of Activities 2
Duration: 4h30			Week 6 Date
Context: Mathematical : Functions and inverses			
Link with previous lesson: Logarithms, inverses			
KNOWLEDGE (K): Inverse Functions SKILLS (S):Drawing, determine, interpretation VALUES (V): Appreciation, Respect			
	ACTIVITY 1	ACTIVITY 2	
Activity Content	Inverse Functions	Characteristics of graphs	
LO,s and AS's	LO2 AS12.1,2,3	LO2 AS12.1,2,3	
Detail of Activity	<p>Determine which inverses are functions and how the domain of the</p> <p>Original function needs to be restricted so that the inverse is also a function.</p> <p>Use and interpret functional notation. In the teaching process learners must understand how $f(x)$ has been transformed to generate</p> <p>$f(-x)$, $-f(x)$, $f(x+a)$, $f(x)+a$, $f(ax)$, $af(x)$ and $x=f(y)$</p>	<p>Identify characteristics as listed below and hence use applicable characteristics to sketch graphs of the inverses of the functions listed above:</p> <p>(a) domain and range;</p> <p>(b) intercepts with the axes;</p> <p>(c) turning points, minima and maxima;</p> <p>(d) asymptotes;</p> <p>(e) shape and symmetry;</p> <p>(f) Average gradient (average rate of change); intervals on which the function increases/decreases.</p>	
Teaching Methods	question and answer	Question and answer	
Assessment Strategy :Form : Tool :Method	Class work home work Memo Educator, group	Class work home work Memo Educator, individual, peer	
Expanded Opportunities:	Different examples and remedial work	Different examples and remedial work	
Resources	Work sheets, calculator, Charts , textbook		
Teacher reflection			

LESSON PLAN: 4

Subject: MATHEMATICS		Grade 12	
Lesson Plan: Analytical Geometry		Number of Activities 3	
Duration: 4h30		Week 7 Date	
Context: Mathematical : Investigation of space			
Link with previous lesson: Distance formula between 2 points, Radius perpendicular to the tangent at point of contact, completing the square.			
KNOWLEDGE (K): Eqn of the circle centre at the origin and not at the origin. Find the centre & radius of a circle by completing the square. Determine the equation of a circle. Calculate the equation of a tangent of a circle. SKILLS (S): Derive , calculation, application VALUES (V): Appreciation and sharing ideas.			
	ACTIVITY 1	ACTIVITY 2	ACTIVITY 3
Activity Content	Equation of a circle	Finding the centre and the radius of the circle	Equation of the tangent
LO,s and AS's	12.3.3(a)	12.3.3(a)	12.3.3(b)
Detail of Activity	<p>Learners are reminded of the distance formula between 2 points on a Cartesian plane in the form of a class exercise.</p> <p>The teacher presents a chart with one circle at the origin and the other one not at the origin.</p> <p>Learners are then asked to find the distance P@ in both cases.</p> <p>Learners will first get the coordinates of points P and O.</p> <p>$OP^2 = r^2 = (x-0)^2 + (y-0)^2$ and $(x-a)^2 + (y-b)^2 = r^2$</p> <p>The teacher further explains to learners the difference between the 2 circles.</p> <p>Examples from the textbook to find the equation of a circle are done on the chalkboard.</p> <p>Class work is given to learners so as to find the equation of circle. In both cases, learners will be asked to work in groups.</p> <p>The teacher will be moving around guiding them where necessary.</p> <p>More exercises are given as homework.</p>	<p>Learners will be given the equation e.g. $x^2 + y^2 + 6x - 8y - 11 = 0$ then asked to group them according to the common factors. They are then asked to complete the square for both x and y with guidance of the teacher.</p> <p>Getting to $(x+3)^2 + (y-4)^2 = 36$. They will be asked to determine the centre and the radius of the circle.</p> <p>The teacher will be helping the groups comparing with the general equation i.e. $(x-a)^2 + (y-b)^2 = r^2$. Where the centre is (a;b) and radius r</p> <p>From this, learners will identify the centre after completion of the square i.e. (-3; 4) and r= 6.</p> <p>Learners will be given more exercises in class to do and will be given more time to discuss and teach each other in groups.</p>	<p>Learners are asked the relation between the radius and the tangent of a at the point of contact.</p> <p>The teacher explains to learners how to get the gradient of the tangent from AB perpendicular to PO where $M_{AB} * M_{PO} = -1$</p> <p>Example to be done on the chalkboard. Given a sketch learners will get the gradient of OP which will be guided to get to the gradient of the tangent AB. $M_{OP} = -3/2$ and $M_{AB} = 2/3$.</p> <p>Learners in groups will get the equation of the straight line AB using the equation of a circle.</p> <p>Learners will do different exercises in groups with the help of the teacher.</p>

Teaching Methods	Discussion, question and answer	Question and answer	Discussion, question and answer
Assessment Strategy :Form : Tool :Method	Class work home work Memo Educator, group	Class work home work Memo Educator, individual, peer	Class work, home work , test Memo Educator, group
Expanded Opportunities:	Different examples and remedial work . Use of different equations		
Resources	Work sheets, calculator, Charts , textbook		

LESSON PLAN: 5

Subject: MATHEMATICS		Grade 12	
Lesson Plan: FINANCIAL MATHEMATICS		Number of Activities 3	
Duration: 4h30		Week8-9 Date	
Context: Financial			
Link with previous lesson: Number patterns			
KNOWLEDGE (K): Calculating the period of investment, understanding different types of loans, SKILLS (S): Investigate, Calculate			
VALUES (V): Team member, financial discipline			
	ACTIVITY 1	ACTIVITY 2	ACTIVITY 3
Activity Content	Periods of investment	Annuities	Bond repayment
LO,s and AS's	LO 1 AS12.1.4,5	LO 1 AS12.1.4,5	LO 1 AS12.1.4,5
Detail of Activity	<p>Educators hands out worksheet and assess the learners work (ability to use calculators) to calculate the value of n in the formula : $A = P (1 \pm i)^n$</p> <p>Facilitates and use a checklist to see if learners are able to calculate the value of n using a calculator and later discuss the different periods of investments.</p>	<p>Discussion-teacher explains the annuity concept and how the geometric series is used for the calculation of annuities, giving examples. Apply knowledge of geometric series to solve annuity, with or without the use of the formulae:</p> $F = \frac{x[(1+i)^n - 1]}{i}$ <p>and</p> $P = \frac{x[(1 - (1+i)^{-n})]}{i}$ <ul style="list-style-type: none">Timelines are a useful strategy to solve problems in Financial Mathematics.	<p>Discussion-teacher explains bond repayment problems and how the geometric series is used for the calculation of bond repayments, giving examples. Apply knowledge of geometric series to bond repayment problems, with or without the use of the formulae:</p> $F = \frac{x[(1+i)^n - 1]}{i}$ <p>and</p> $P = \frac{x[(1 - (1+i)^{-n})]}{i}$ <ul style="list-style-type: none">Timelines are a useful strategy to solve problems in Financial Mathematics.

Teaching Methods	Discussion, question and answer	Question and answer	Discussion, question and answer
Assessment Strategy :Form : Tool :Method	Class work home work Memo Educator, group	Class work home work Memo Educator, individual, peer	Class work, home work , test Memo Educator, group
Expanded Opportunities:	Different examples and remedial work Learners are asked to go to the different Banking Institutions to investigate different types of investment and which one gives better returns. Teacher brings to class different pamphlets from different Banking Institutions and let the learners investigate which bank will give a better return.		
Resources	Work sheets, calculator, Charts , textbook		

LESSON PLAN: 6

Subject: MATHEMATICS		Grade 12	
Lesson Plan: Financial Matters		Number of Activities 2	
Duration: 4h30		Week10 Date	
Context: Financial			
Link with previous lesson: number patterns, logarithms			
KNOWLEDGE (K): Calculating the period of investment, understanding different types of loans, SKILLS (S): Investigate, Calculate			
VALUES (V): Team member, financial discipline			
	ACTIVITY 1	ACTIVITY 2	
Activity Content	Sinking value	Analysis of investment and loans	
LO,s and AS's	LO 1 AS12.1.4,5	LO 1 AS12.1.4,5	
Detail of Activity	<p>Teacher explains the sinking fund concept and how it can be calculated and apply knowledge of geometric series to sinking fund problems, with or without the use of the formulae:</p> $\bullet \quad F = \frac{x[(1+i)^n - 1]}{i}$ <p>and $P = \frac{x[(1 - (1+i)^{-n})]}{i}$</p> <ul style="list-style-type: none">Timelines are a useful strategy to solve problems in Financial Mathematics.	<p>Critically analyse investment and loan options and make informed decisions as to the best option(s) (including pyramid and micro-lenders' schemes).</p>	
Teaching Methods	Question and answer	Question and answer	Discussion, question and answer
Assessment Strategy :Form : Tool :Method	Class work home work Memo Educator, group	Class work home work Memo Educator, individual, peer	Class work, home work , test Memo Educator, group
Expanded Opportunities:	<p>Different examples and remedial work Learners are asked to go to the different Banking Institutions to investigate different types of investment and which one gives better returns.</p> <p>Teacher brings to class different pamphlets from different Banking Institutions and let the learners investigate which bank will give a better return.</p>		
Resources	Work sheets, calculator, Charts , textbook		

