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 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  
**Lesson Plan:** NUMBER PATTERNS  
**Grade:** 12  
**Duration:** 4h30  
**Number of Activities:** 3  
**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

<table>
<thead>
<tr>
<th>Activity Content</th>
<th>Arithmetic and geometric sequences</th>
</tr>
</thead>
<tbody>
<tr>
<td>LO,s and AS’s</td>
<td>LO 1 AS 12.1.3. a, b, c.</td>
</tr>
<tr>
<td>Detail of Activity</td>
<td>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 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. Calculate the term value and the number of terms in a sequence of any pattern.</td>
</tr>
</tbody>
</table>

### ACTIVITY 2

<table>
<thead>
<tr>
<th>Activity Content</th>
<th>Sigma notation</th>
</tr>
</thead>
<tbody>
<tr>
<td>LO,s and AS’s</td>
<td>LO 1 AS 12.1.3. a, b, c.</td>
</tr>
<tr>
<td>Detail of Activity</td>
<td>Educator gives worksheet so that learners correctly interpret sigma notation and convert fluently between Σ notation and expanded notation. Prove and correctly select the formula for and calculate the sum of series, including:</td>
</tr>
</tbody>
</table>
|                  | \[
|                  | \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} ar^{i-1} = \frac{a(r^n-1)}{r-1} ; r \neq 1  
|                  | \sum_{i=1}^{\infty} ar^{i-1} = \frac{a}{1-r} \text{ for } -1 < r < 1  
|                  | |

### ACTIVITY 3

<table>
<thead>
<tr>
<th>Activity Content</th>
<th>Sum of series</th>
</tr>
</thead>
<tbody>
<tr>
<td>LO,s and AS’s</td>
<td>LO 1 AS 12.1.3. a, b, c.</td>
</tr>
<tr>
<td>Detail of Activity</td>
<td></td>
</tr>
</tbody>
</table>

**Teaching Methods**  
- Question and answer  
- Question and answer  
- Discussion, question and answer

**Assessment Strategy:**  
- 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: 2

**Subject:** MATHEMATICS  
**Lesson Plan:** FUNCTIONS, INVERSES AND LOGARITHMS  
**Duration:** 4h30  
**Number of Activities:** 3  
**Grade:** 12  
**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 Content:** Logarithms  
- **LO.s and AS’s:** LO1, AS 12.1.2
- **Detail of Activity:** 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. Learners need to convert fluently between logarithmic form and exponential form. Note: Solving logarithm equations and inequalities must be seen in the context of functions.)

### Activity 2
- **Activity Content:** Types of functions  
- **LO.s and AS’s:** LO2, AS 12.1.2, 3
- **Detail of Activity:** 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.  
  - Given the relationship between \( x \) and \( y \) in a set of graphs  
  - tables  
  - words  
  - algebraic formulae  
  Determine whether the given information represents a function.

### Activity 3
- **Activity Content:** Graphs of inverse relations  
- **LO.s and AS’s:** LO2, AS 12.1.2, 3
- **Detail of Activity:** Learners draw graphs of the inverse relations, of functions, in particular the inverse of: \( y = ax + q \); \( y = ax^2 \); \( y = a^x \); \( a > 0 \):  

**Teaching Methods**
- Activity 1: Question and answer  
- Activity 2: Question and answer  
- Activity 3: Discussion, question and answer

**Assessment Strategy:**
- **Form:** Class work, home work  
- **Tool:** Memo, Educator, group

**Expanded Opportunities:**
- Different examples and remedial work

**Resources:** Work sheets, calculator, Charts, textbook
ACTIVITY 1

Activity Content: Inverse Functions

LO's and AS's: LO2 AS12.1,2,3

Detail of Activity: Determine which inverses are functions and how the domain of the Original function needs to be restricted so that the inverse is also a function.

Use and interpret functional notation. In the teaching process learners must understand how \( f(x) \) has been transformed to generate

\[
\begin{align*}
&f(-x), \quad -f(x), \quad f(x+a), \quad f(x)+a, \\
&f(ax), \quad af(x) \quad \text{and} \quad x = f(y)
\end{align*}
\]

Teaching Methods: Question and answer

Assessment Strategy: Form: Tool: Method
- Class work: home work
- Memo
- Educator, group

Expanded Opportunities: Different examples and remedial work

Resources: Work sheets, calculator, Charts, textbook

Teacher reflection
### LESSON PLAN: 4

**Subject:** MATHEMATICS  
**Lesson Plan:** Analytical Geometry  
**Duration:** 4h30  
**Grade:** 12  
**Number of Activities:** 3  
**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.

<table>
<thead>
<tr>
<th>ACTIVITY 1</th>
<th>ACTIVITY 2</th>
<th>ACTIVITY 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Activity Content</strong></td>
<td>Equation of a circle</td>
<td>Finding the centre and the radius of the circle</td>
</tr>
<tr>
<td><strong>LO,s and AS’s</strong></td>
<td>12.3.3(a)</td>
<td>12.3.3(a)</td>
</tr>
<tr>
<td><strong>Detail of Activity</strong></td>
<td>Learners are reminded of the distance formula between 2 points on a Cartesian plane in the form of a class exercise. The teacher presents a chart with one circle at the origin and the other one not at the origin. Learners are then asked to find the distance P® in both cases. Learners will first get the coordinates of points P and O. OP² = r² = (x-0)² + (y-0)² and (x-a)² + (y-b)² = r² The teacher further explains to learners the difference between the 2 circles. Examples from the textbook to find the equation of a circle are done on the chalkboard. Class work is given to learners so as to find the equation of the circle. In both cases, learners will be asked to work in groups. The teacher will be moving around guiding them where necessary. More exercises are given as homework.</td>
<td>Learners will be given the equation e.g. x² + y² + 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. Getting to (x+3)² + (y-4)² = 36. They will be asked to determine the centre and the radius of the circle. The teacher will be helping the groups comparing with the general equation i.e. (x-a)² + (y-b)² = r². Where the centre is (a;b) and radius r From this, learners will identify the centre after completion of the square i.e. (-3; 4) and r = 6. Learners will be given more exercises in class to do and will be given more time to discuss and teach each other in groups.</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Teaching Methods</th>
<th>Discussion, question and answer</th>
<th>Question and answer</th>
<th>Discussion, question and answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment Strategy : Form</td>
<td>Class work, home work, Memo</td>
<td>Class work, home work, Memo</td>
<td>Class work, home work, test, Memo</td>
</tr>
<tr>
<td>: Tool</td>
<td>Memo</td>
<td>Memo</td>
<td>Memo</td>
</tr>
<tr>
<td>: Method</td>
<td>Educator, individual, peer</td>
<td>Educator, group</td>
<td>Educator, group</td>
</tr>
<tr>
<td>Expanded Opportunities:</td>
<td>Different examples and remedial work, Use of different equations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resources</td>
<td>Work sheets, calculator, Charts, textbook</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
LESSON PLAN: 5

Subject: MATHEMATICS                                                                                                          Grade 12
Lesson Plan: FINANCIAL MATHEMATICS                                                                                             Number of Activities 3
Duration: 4h30                                                                                                                Week 8-9  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

<table>
<thead>
<tr>
<th>Activity Content</th>
<th>ACTIVITY 1</th>
<th>ACTIVITY 2</th>
<th>ACTIVITY 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>LO,s and AS’s</td>
<td>LO 1 AS12.1.4,5</td>
<td>LO 1 AS12.1.4,5</td>
<td>LO 1 AS12.1.4,5</td>
</tr>
<tr>
<td>Detail of Activity</td>
<td>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 ± i)^n 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.</td>
<td>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: F = x[(1 + i)^n - 1] [1] and P = x[(1 - (1 + i)^-n)] i</td>
<td>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: F = x[(1 + i)^n - 1] [1] and P = x[(1 - (1 + i)^-n)] i</td>
</tr>
</tbody>
</table>

- Timelines are a useful strategy to solve problems in Financial Mathematics.
<table>
<thead>
<tr>
<th>Teaching Methods</th>
<th>Discussion, question and answer</th>
<th>Question and answer</th>
<th>Discussion, question and answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment Strategy: Form</td>
<td>Class work, home work, Memo, Educator, group</td>
<td>Class work, home work, Memo, Educator, individual, peer</td>
<td>Class work, home work, test, Memo, Educator, group</td>
</tr>
<tr>
<td>Expanded Opportunities:</td>
<td>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.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resources</td>
<td>Work sheets, calculator, Charts, textbook</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### LESSON PLAN: 6

**Subject:** MATHEMATICS  
**Lesson Plan:** Financial Matters  
**Grade:** 12  
**Duration:** 4h30  
**Number of Activities:** 2  
**Week:** 10

**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

<table>
<thead>
<tr>
<th>ACTIVITY 1</th>
<th>ACTIVITY 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Activity Content</strong></td>
<td>Sinking value</td>
</tr>
<tr>
<td><strong>LO,s and AS’s</strong></td>
<td>LO 1 AS12.1.4,5</td>
</tr>
</tbody>
</table>
| **Detail of Activity** | 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:  
\[ F = \frac{x(1 + i)^n - 1}{i} \]  
and  
\[ P = \frac{x(1 - (1 + i)^{-n})}{i} \]  
- Timelines are a useful strategy to solve problems in Financial Mathematics. | Critically analyse investment and loan options and make informed decisions as to the best option(s) (including pyramid and micro-lenders’ schemes). |

**Teaching Methods**  
- Question and answer  
- Discussion, question and answer

**Assessment Strategy:**  
- Form: Tool  
- Method: 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