**MATHEMATICS LESSON PLAN**

**GRADE 7**

**TERM 3: July – September**

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| **PROVINCE:** |  |
| **DISTRICT:** |  |
| **SCHOOL:** |  |
| **TEACHER’S NAME:** |  |
| **DATE:** |  |
| **DURATION**: | 1 Hour |

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| 1. **TOPIC: NUMERIC AND GEOMETRIC PATTERNS**: Numeric patterns**(Lesson 3)** |

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| 1. **CONCEPTS & SKILLS TO BE ACHIEVED:**   **By the end of the lesson, learners should be able to :**   * Investigate and extend numeric patterns looking for relationships between numbers, including patterns: * not limited to sequences involving a constant difference or ratio. * of learners’ own creation * represented in tables * describe and justify the general rules for observed relationships between numbers in own words |

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| 1. **RESOURCES:** | DBE workbook 2, Sasol-Inzalo book 2, Textbooks |
| 1. **PRIOR KNOWLEDGE:** | * Functions and relationship * Number sentence * describe and justify the general rules for observed relationships between numbers in own words * squares and square roots * cubes and cube roots * algebraic language * Exponents |
| 1. **REVIEW AND CORRECTION OF HOMEWORK** (suggested time: 10 minutes)   Homework provides an opportunity for teachers to track learners’ progress in the mastery of mathematics concepts and to identify the problematic areas which require immediate attention. Therefore it is recommended that you place more focus on addressing errors from learner responses that may later become misconceptions. | |

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| **INTRODUCTION**(Suggested time: 10 Minutes)  Ask learners to complete the activity below:  **Activity 1**   1. Extend the patterns below by writing down the next three terms. 2. 1; 4; 9;\_\_\_; \_\_\_\_; \_\_\_\_ 3. 3; 8; 18; 33; \_\_\_\_; \_\_\_\_;\_\_\_\_\_ 4. ; ; ;\_\_\_; \_\_\_\_; \_\_\_\_ 5. 1; 8; 27; ;\_\_\_; \_\_\_\_; \_\_\_\_ 6. Write down how you got the next terms in these sequences above in own words   Note: After learners have given their explanations, consolidate as follows:  1  4  9  16  3  5  7  Use the explanation such as the one above to explain to learners that the pattern has **neither** a **constant ratio nor a constant difference**.  **Note:** When learners can extend the patterns with neither a **constant difference nor a constant ratio**, they are ready to move on to describing the **general rule** for the pattern **in own words**, predict any input or output value in the pattern given the rule.  Encourage the learners to **describe the general rule in own words** by looking at the **relationship** between the **input value** ( *position of the term/ tem number*) and **the output** value  (*the term itself,*)by first writing the **number sentence** and there after replace the **position of the term** by any **variable**, e.g. , where is a natural number.  Explain to the learners that if patterns are not represented in tables, the term which appears **first** in the pattern is the **first term,** unless stated otherwise.  **Equivalent descriptions of the rule for pattern A**   * **in words :** multiply the position number by itself * **using number sentence :** 2 2 4 , where **2 in** 2 **2** is the position of the term**,** and **4** is the term itself , * **in algebra : or** |

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| 1. **LESSON PRESENTATION/DEVELOPMENT**(Suggested time: 25 minutes) | |
| **Teaching activities** | **Learning activities**  (Learners are expected to:) |
| Activity   1. Complete the flow diagram below.   A  1  2  3  4  B  1  2  3  4  C  1  2  3  4   1. Ask learners to illustrate the input and the output values for each flow diagram by means of a table   Example :A   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | |  | 1 | 4 | 9 | 16 |  |  1. Divide the learners into groups .Ask them to carry out the instructions and answer the questions that follow  * From each table, subtract two consecutive terms from right to left * What do you call the answer you got above? * Is the answer you got above the same throughout the pattern? * Subtract the first level differences from right to left until you find the common difference. * At which level did you find the common difference? * What is the exponent of the variable in the flow diagram? * What can you say about the degree/ exponent of the variable and the level of the difference? * What do you notice about the second level difference and the coefficient in the rule of each equivalent description, i.e. flow diagram and table? * Multiply the position of the term by itself in each table and compare each product to the output. * How does the product differ from the output/ what do you do to each product in order to get each output in B and C? * Is what you do above the same throughout the pattern? * Write any number sentence to describe the relationship between the input and the output in each table. * Describe the relationship between the input and output values in your own words. * Use your rule to find the 10th term in each table * After having completed the activity, ask the learners if it is possible to predict any term. The response should be YES. Ask them to briefly explain which steps to follow in order to write a general rule for the pattern.   **Note**: After learners have completed the activity, they can conclude by understanding that in a pattern with **neither** a constant difference **nor** constant ratio,   * the level at which the constant difference is found determines the exponent of the variable in the rule and the pattern is referred to as **quadratic**. Note that learners do not have to know the concept quadratic since it’s not within the scope of senior phase. * to get the co-efficient of the variable , divide constant difference by 2 * the constant can be found by writing the number sentence of any term using the constant difference, the position of the term and the term itself   **Example**   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 |  | *8* |  | 20 | |  | 3 | 6 | 11 |  | 66 |  | *402* |   In the table above:   * the constant difference **2** is found at second level, hence the degree of the variable is 2. * the coefficient of the variable is the constant difference divided by 2, thus 1. * Multiply the position of the term ( by itself to get which is * Multiply by 1, i.e. the coefficient to get, which is   Find the relationship of the position of the term and the term itself by completing the number sentence  **or**   * Predict any term by multiplying the term number by itself in the number sentence or substituting for in e.g. find the 20th term   or   * Find the position of the term given the term by using the inverse operations from right to left, e.g.   Find the position of the term if the term  **is 102**     1. Ask learners to create their own patterns like the ones above and give the rule in own words | * Complete the work, as a whole * Complete the work, as individuals * discuss in groups and present their findings to the whole class * design their patterns and generalise them |

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| 1. **CLASSWORK**(Suggested time: 10 minutes)   **Note:** Give the learners different numbers patterns to extend and generalise. Make them understand 1) 1) Extend the pattern below by the next 3 terms  4; 7; 12 ;\_\_\_\_\_; \_\_\_\_\_\_;\_\_\_\_\_\_   1. Write the rule that describes the pattern in a form of a number sentence. 2. Describe the rule for the pattern in your own words 3. What is the 10th term for the pattern? 4. What is the position of the term whose value is 228? |

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| 1. **CONSOLIDATION/CONCLUSION& HOMEWORK (Suggested time: 5 minutes)** |
| 1. Emphasise that:  * to extend a pattern, look for common difference between the terms. * to predict any term or position of the term in the pattern, first find the general rule. * to find the general rule for the pattern, look for the relationship between the position of the term and the term itself by following these steps. * identify the level of the common difference * decide on what the exponent of the variable will be * decide on what the coefficient of the variable will be * write the number sentence  1. The primary purpose of Homework is to give each learner an opportunity to demonstrate mastery of mathematics skills taught in class. Therefore Homework should be purposeful and the principle of ‘Less is more’ is recommended, i.e. give learners few high quality activities that address variety of skills than many activities that do not enhance learners’ conceptual understanding.   Carefully select appropriate activities from the Sasol-Inzalo books, workbooks and/or textbooks for learners’ homework. The selected activities should address different cognitive levels.  **Recommended Homework**:   1. Write the 10th term in 3; 5; 10;... 2. What is the position of the term whose value is 402?   **Recommended investigation:**  Allow learners to investigate how to find a general rule with cubes by following the steps done on how to find the general rule when a pattern is quadratic. |