**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 2)** |

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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: * limited to sequences involving a constant 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 * Algebraic language * Representing numbers in exponential form * Perform calculations with exponents up to exponent 5 |
| 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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| 1. **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. 2; 4; 8;\_\_\_; \_\_\_\_; \_\_\_\_ 3. 0,5; 0,25; 0,125;\_\_\_; \_\_\_\_; \_\_\_\_ 4. ; ; ;\_\_\_; \_\_\_\_; \_\_\_\_ 5. Write down how you got the next numbers in these sequences in own words   Note: After learners have given their explanations, consolidate as follows:  2  4  8  16  Use the explanation such as the one above to explain to learners that the **same** number multiplying each term to get the next term is called the **constant ratio.**  **( divisorratiodividend, dividenddivisorquotient or ratio )**  **Note:** When learners can extend the patterns with **constant ratio**, they are ready to move on to describing the **general rule** for the pattern with whole numbers **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 ratio by itself the number of times * **using number sentence :**  2, where **1 in represented by** in is the position of the term**, 2 in**  or in is the constant ratio * **in algebra :** |

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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 diagrams below.   A  1  2  3  4  5  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  B  1  2  3  4  5  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  C  1  2  3  4  5  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  D  1  2  3  4  5  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_   1. Ask learners to illustrate the input and the output values for each flow diagram by means of a table   **Example**  Patten D   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | |  | 6 | 12 | 24 | 48 |  |  1. Divide the learners into groups. Ask them to carry out the instructions and answer the following questions  * 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? * continue to subtract until you find the constant difference. * If you can’t find the constant difference, then find the ratio by dividing two consecutive terms where the term on the left is always the divisor and check if it is the same? * What do you notice about the constant ratio and the base of the power in the rule of each equivalent description, i.e. flow diagram and table? * Write each output as factors where one factor is the ratio (a base in a case of the rule in the flow diagram) * Write the factors in exponential form * compare the exponent of the ratio of each term to the position of the term * write the rule as a power where the base is the constant ratio and the exponent is the position of the term. * 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.  1. After having completed the activity, ask the learners if it is possible to predict any term without multiplying each term by the constant ratio. 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 a constant ratio,   * the constant ratio indicates that the pattern is exponential * the constant ratio is the base of the power * the exponent can be found by writing each term as the product of factors, where one factor is a ratio and then write these factors in exponential form * the position of the term becomes the exponent   **Example: Pattern A**   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | |  | 3 | 9 | 27 | 81 |  |   **Generalising**  constant ratio is 3   |  |  |  |  | | --- | --- | --- | --- | | Term no. | Value of the term | Factors written using the ratio | Power | |  |  |  |  | |  |  |  |  | |  |  |  |  | |  |  |  |  |   or  raise the ratio to exponent , where is a natural number and represents the position of the term  **Example: Pattern D**   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | |  | 6 | 12 | 24 | 48 |  |   **Generalising**  Constant ratio is 2, therefore 2 is raised to exponent , the position number and will give  New pattern from : 2; 4; 8; 16; 32  Dividing the terms for the same position in the original pattern and the new pattern  6  12  24  48  Original pattern  New pattern  2  4  8  12  3  3  3  3  New ratio   * The new constant ratio**3** is the multiplier in the original rule * Multiply the rule by the new constant ratio : * test the rule by completing a number sentence * Predict any term by raising the base to the position number up to position 5 in the number sentence by substituting for in e.g. find the 5th term   Or   1. Ask learners to create their own patterns like the ones above and give the rule in own words | * Complete the work * 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 number patterns to extend and generalise.  **Activity**   1. Extend the patterns below by the next three numbers 2. 4; 16; 64; ;\_\_\_; \_\_\_\_; \_\_\_\_ 3. 0,4; 0,16; 0,064; ;\_\_\_; \_\_\_\_; \_\_\_\_ 4. ; ; ;\_\_\_; \_\_\_\_; \_\_\_\_ 5. Write the rule that describes the pattern in a form of a number sentence. 6. Describe the rule for each pattern in own words 7. What is the 5th term for the pattern? |

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| 1. **CONSOLIDATION/CONCLUSION& HOMEWORK (Suggested time: 5 minutes)** |
| 1. Emphasise that:  * to extend a pattern, look for common ratio 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. * Find the common difference * If there is no common difference, Find the common ratio * Write each term as a power where the base is the common ratio * write the number sentence/ general rule in own words/ algebraically  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. Extend the pattern below by writing the next 3 terms,   10; 50; 250; \_\_\_\_\_;\_\_\_\_\_; \_\_\_\_\_   1. Find the general rule , hence the 5th term |