**LESSON DEVELOPMENT TWO**

**SUBTRACTION OF BINARY NUMBER SYSTEM**

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| **STAGE/TIME** | **TEACHER’S ACTIVITIES** | **LEARNER'S ACTIVITIES – MIND/HANDS ON** | **LEARNING POINTS** |
| **Step 1**  **Introduction – Introductory Activities**  **(5 minutes)** | Lets the pupils add these numbers together –  1. 1 7 – 1 3 =  2. 4 5 – 27 =  Tells the pupils that, whenever they borrow 1 from the next digit in decimal numbers, the 1 is 10. | Solution 1 Solution 2  (3)(15)  1 7 4 5  + 1 3 + 2 7  4 1 8 | Linking the Previous knowledge to the new lesson |
| **Step 2**  **Development**  **(5 minutes)**  **Grouping** | 1. Groups the learners into four groups – A, B, C, and D.  2. Guide the learners to choose a leader and secretary for your group.  3. Gives each group learning materials – chart showing simple subtraction of binary numbers. | 1. Belong to a group.  2. Choose their leader and secretary.  3. Received learning materials for their group. | Learner’s group, leader and secretary confirmed. |
| **Step 3**  **Development – Groups Activities**  **(5 minutes)** | Lets pupils to study the chart carefully.  Asks them to compare the results of both subtraction of decimal and binary numbers together.  Asks the pupils – Did You observe any difference?  If yes, what’s and observations? | |  |  | | --- | --- | | **Decimal Numbers** | **Binary Numbers** | | **0 – 0 = 0**  **1 – 0 = 1**  **1 – 1 = 2**  **10 – 1 = 9** | **0 – 0 = 0**  **1 – 0 = 1**  **1 – 1 = 0**  **10 – 1 = 1** |   Yes, there’s different. 1 + 1 = 10, how?  Tells them that 1 + 1 = 2 (base 2). Convert 2 to base 10, 2/2 = 1 R 0. Add 0 digit 1, it gives 10. Therefore, 1 + 1 = 10. | Introduction to subtraction of binary numbers |
| **Step 4**  **Development – Groups Activities**  **(5 minutes)** | Guides the pupils to add this binary numbers –  111 + 101 | Solution 1  1 1 1  + 1 0 1  1 1 0 0  Teacher’s contribution – 1 + 1 = 10, write down 1 and carry 1. 1 + 1 + 1 = 3 (base 10), 3 to base 2 is 11. That’s 3/2 = 1 R 1. Add 1 digit to 1 gives 11. | Addition of binary numbers |
| **Step 5**  **Development – Groups Activities and Presentation**  **(15 minutes)** | Groups work  Add  1. 101 + 111  2. 1011 + 1101 | Presentation | Addition of binary |
| **Step 5**  **Development**  **(5 minutes)** | To conclude the lesson, the teacher revises the entire lesson and ask the key questions.  **SUMMARY**  To add an expression in base two notation, just do the arithmetic. | The learners listen, ask and answer questions.  **KEY QUESTIONS**  Lets each of the pupils add  1. 101 + 111  2. 1011 + 1101 | Lesson Evaluation and Conclusion |