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| **THEME:** | Binary numbers |
| **DATE**: | 09 – 09 – 2024 |
| **CLASS**: | Js 3 |
| **TIME**: | 8:40-09:20am |
| **DURATION** | 40 MINUTES |
| **PERIOD** | 1& 2 |
| **SUBJECT**: | Mathematics |
| **UNIT TOPIC:** | Binary Numbers |
| **LESSON TOPIC:** | Conversion of numbers from one base to another. |

**SPECIFIC OBJECTIVE**: By the end of the lesson, students should be able to

1. Mention the characteristics of binary number system
2. Show the steps in converting numbers from other base to base two
3. Convert numbers from base 10 to base 2 and base 2 to other bases

**INSTRUCTIONAL RESOURCES:** Charts and flash cards

**LESSON PRESENTATION**

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| **STEP 1** | **PREVIOUS KNOWLEDGE:** the students have knowledge of binary numbers from js2 where they were taught how to convert numbers from base 10 to base 2. | | Students recall. |
| **STEP 2** | **EXPLORATION:**  The teacher introduces the topic with the following questions:   1. What are the characteristics of binary number system? 2. State steps in converting numbers from other bases to binary 3. Can you convert a decimal number to binary? | | Students make attempt to answer the questions. |
| **STEP 3**  **Objective 1;**  **Objective 2;**  **Objective 3;** | **DISCUSSION:**  ***Teacher starts the discussion by stating the characteristics of binary as follows*:**   1. Uses two digits, 0 and 1. 2. Also called base 2 number system 3. Each position in a binary number represents a 0 power of the base (2). Example: 20 4. Last position in a binary number represents an x power of the base (2). Example: 2x where x represents the last position - 1   Steps of converting other number basis to base 2   1. **Step 1** − Divide the number to be converted by the value of the new base. 2. **Step 2** − Get the remainder from Step 1 as the rightmost digit (least significant digit) of new base number. 3. **Step 3** − Divide the quotient of the previous divide by the new base. 4. **Step 4** − Record the remainder from Step 3 as the next digit (to the left) of the new base number.   Repeat Steps 3 and 4, getting remainders from right to left, until the quotient becomes zero in Step 3.  The last remainder thus obtained will be the Most Significant Digit of the new base number.  Examples  Express 8510 to a number in base 2.  2 85  2 42 R 1  2 21 R 0  2 10 R 1  2 5 R 0  2 2 R 1  1 R 0  0 R 1  8510 = 10101012  Express 10710 to a number in base 2.  2 107  2 53 R 1  2 26 R 1  2 13 R 0  2 6 R 1  2 3 R 0  2 1 R 1  0 R 1  10710 = 11010112  Express 15210 to a number in base 2.  2 152  2 76 R 0  2 38 R 0  2 19 R 0  2 9 R 1  2 4 R 1  2 2 R 0  2 1 R 0  0 R 1  15210 = 100110002  **Converting Base Two Numbers to Base 10 Numbers**  Example: Convert (i) 101two (ii) 1112 to base 10  **SOLUTION**   1. 1012 = 1x22 + 0x21 + 1x20   = 4 + 0 + 1  = 510   1. 1112 = 1x22 + 1x21 + 1x20   = 4 + 2 + 1  = 910 | | Students listen attentively and take down notes. |
| **STEP 4** | **APPLICATION:** convert10.10012 a number in base 10  Solution  10.10012 = | | Students ask questions on the topic which the teacher answers. |
| **STEP 5** | **EVALUATION:** the teacher evaluates the students with the following questions:   1. What steps can be used to convert numbers from other bases to binary? 2. Convert 244 to a number in base 2. 3. Convert 11.112 to a number in base 10 | | The students answer the questions. |
| **Assignment**   1. Convert 89410 to a number in base 2 2. Express 72210 in binary   **References**  **New concept mathematics for Jss3 by A. A. Arigbabu et al.**  **New general mathematics for Jss3 by M/ F. Macrae et al.** | |  |