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| PRESENTATION | The teacher presents the lesson through the following steps. |  |  |
| STEP 1 | **IDENTIFICATION OF PRIOR IDEA** |  |
|  | The teacher activates prior knowledge by asking the students to mention the number groups they know. He also writes the number 256,492,018.37 on the board and tasks the students to create a place value chart. | The students answer the question. |
| STEP 2 | **EXPLORATION** |  |
|  | The teacher explores further by asking the students the following questions;  1 define number system  2 what is decimal numeral system  3 name and list digits of different base  4 how can numbers be converted from base 10 to other bases | The students perform the task. |
| STEP 3 | **DISCUSSION** |  |
|  | **Denary/Decimal Numeral System**  A number system is a system that lets us express numbers in writing.  Decimal numeral system, also called Hindu-Arabic number system, is the standard system for denoting integer and non-integer numbers. The decimal digits are 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9.  Other numeral system includes:  Binary (base 2) — 0, 1  Ternary (base 3) — 0, 1, 2  Quaternary (base 4) — 0, 1, 2, 3  Quinary (base 5) — 0, 1, 2, 3, 4  Senary (base 6) — 0, 1, 2, 3, 4, 5  Septenary (base 7) — 0, 1, 2, 3, 4, 5, 6  Octal (base 8) — 0, 1, 2, 3, 4, 5, 6, 7  Nonary (base 9) — 0, 1, 2, 3, 4, 5, 6, 7, 8  **Conversion of numbers in base 10 to other bases**  The general steps for converting a base 10 number into another base are:   1. First, divide the “desired” base into the number you are trying to convert; 2. Write the quotient (the answer) with a remainder; 3. Repeat this division process using the whole number from the previous quotient; 4. Continue repeating this division until the number in front of the remainder is only zero; 5. The answer is the remainder read from the bottom up |  |
| STEP 4 | **APPLICATION** |  |
|  | Example 1  Convert 3110 to:  (a) base 2 (b) base 6  Solution  (a)   |  |  | | --- | --- | | 2 | 31 | | 2 | 15 R 1 | | 2 | 7 R 1 | | 2 | 3 R 1 | | 2 | 1 R 1 | |  | 0 R 1 |   3110 11 1112  (b)   |  |  | | --- | --- | | 6 | 31 | | 6 | 5 R 1 | |  | 0 R 5 |   3110 516  Example 2  Convert 25.0625*ten* to binary.  Solution  First, split 25.0625*ten* into two parts   1. 25*ten* 2. 0.0625*ten*   Then add the result  25*ten*   |  |  | | --- | --- | | 2 | 25 | | 2 | 12 R 1 | | 2 | 6 R 0 | | 2 | 3 R 0 | | 2 | 1 R 1 | |  | 0 R 1 |   25*ten* 11001*two*  0.0625*ten*   |  |  | | --- | --- | | 0. | 0625 | |  | 2 | | 0 | 1250 | |  | 2 | | 0 | 2500 | |  | 2 | | 0 | 5000 | |  | 2 | | 1 | 000 |   0.0625*ten* 0.0001*two*  25.0625*ten* 11001*two* 0.0001*two*  11001.00012 | The students listen to the teacher and ask questions. |
| STEP 5 | **EVALUATION** |  |
|  | The teacher evaluates the lesson with the questions below.   1. Define number system and decimal system. 2. List the digits of base 4.   Convert 107510 to a number in base 5. | The students solve the problems. |
| SUMMARY AND CONCLUSION | 1. The teacher concludes the lesson by summarising the unit lesson. |  |
| ASSIGNMENT | Exercise 1.1, pg. 22, questions 6(d) & 9(a) |  |
| REFERENCES | New Concept Mathematics for senior secondary school book 1 by H. N. Odogwu, A. A. Arigbabu, et al.  New School Mathematics for senior secondary school by M. N. David-Osuagwu, Chinwa Anemelu, Ijeoma Onyeozili. |  |
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|  | TEACHER’S ACTIVITY | STUDENT’S ACTIVITY |  |
| THEME | Number and Numeration |  |  |
| CLASS | SS1 |  |  |
| DATE | Tuesday 12th September, 2023 |  |  |
| SUBJECT | Mathematics |  |  |
| MODE | Entire Class |  |  |
| SPECIFIC OBJECTIVES | By the end of this lesson, learners should be able to:   1. Define hexadecimal numeral system and list its numerals; 2. Give examples of hexadecimal numbers; 3. Solve problems of conversion of numbers in base 16 to base 10;   Solve problems of conversion of numbers in other bases to base 10. |  |  |
| INSTRUCTIONAL RESOURCES | Charts showing the conversion from one base (except base 2) to another base, counting cubes |  |  |
| PRESENTATION | The teacher presents the lesson through the following steps. |  |  |
| STEP 1 | **IDENTIFICATION OF PRIOR IDEA** |  |  |
|  | The teacher activates prior knowledge by asking the students to state the polygon with six sides. | The students answer the question. |  |
| STEP 2 | 1. **EXPLORATION** |  |  |
|  | The teacher explores by tasking the students to convert 11112 to base 10. | The students solve the problem. |  |
| STEP 3 | **DISCUSSION** |  |  |
|  | **Hexadecimal Numeral System**  Hexadecimal is the name of the numbering system that is base 16. This system, therefore, has numerals 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, and 15. The two-digit decimal numbers 10, 11, 12, 13, 14 and 15 are represented with the alphabetic characters A, B, C, D, E and F, respectively.  Examples of hexadecimal numbers are 3B2, 2D4, 3AF, etc.  **Conversion from other bases to base 10**  Obtaining numbers in base 10 from given bases involves reversing the original process.  The conversion of numbers from other bases to base 10 is done using the expansion process. |  |  |
| STEP 4 | **APPLICATION** |  |  |
|  | Example 1  Convert the following numbers to decimal numbers:   1. 3124 2. 10 1213   Solution   1. 3124   3211204 (3 42) (1 41) (2 40)  (3 16) (1 4) (2 1)  48 4 0  5210 (Ans)   1. 10 1213   14031221103 (1 34) (0 33) (1 32) (2 31) (1 30)  81 0 9 6 1  9710 (Ans)  Example 2  Convert 3AF16 to a number in base 10.  Solution  32A1F016 (3 162) (A 161) (F 160)  (3 256) (10 16) (15 160)  768 160 15  943 (Ans) | The students listen to the teacher and ask questions. |  |
| STEP 5 | **EVALUATION** |  |  |
|  | The teacher evaluates the lesson with the question below:   1. Define and list the numerals of the hexadecimal system with examples.   Convert 8EB416 to a number in base 10. | The students solve the problem. |  |
| SUMMARY AND CONCLUSION | The teacher concludes the lesson by summarising the unit lesson. |  |  |
| ASSIGNMENT | Exercise 1.2, pg. 23, questions 6 and 10. |  |  |
| REFERENCE | New Concept Mathematics for senior secondary school book 1 by H. N. Odogwu, A. A. Arigbabu, et al.  New School Mathematics for senior secondary school by M. N. David-Osuagwu, Chinwa Anemelu, Ijeoma Onyeozili. |  |  |
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| SPECIFIC OBJECTIVES | At the end of this lesson, learners should be able to:   1. Define decimal fractions with examples; 2. Define bicimals with examples; 3. Convert decimal fractions in other bases to base 10. 4. Convert from other bases greater than base 10 to base 10 |  |
| INSTRUCTIONAL RESOURCES | Charts showing the conversion from one base (except base 2) to another base, counting cubes. |  |
| PRESENTATION | The teacher presents the topic with the aid of these steps: |  |
| STEP 1 | **IDENTIFICATION OF PRIOR IDEA** |  |
|  | The teacher asks the students to define decimal fraction. | The students answer the question. |
| STEP 2 | **EXPLORATION** |  |
|  | The teacher explores by tasking the students to give an example of a decimal fraction and name its parts. | The students solve the equation. |
| STEP 3 | **DISCUSSION** |  |
|  | **Definition of decimal fraction**  A decimal fraction is defined as those fractions whose denominator is a power of 10. E.g., 1/10, 3/100, 54/10, etc.  **Definition of bicimal numbers**  The word bicimal comes from a combination of the word *binary* and *decimal*.  A bicimal is a base two analog of a decimal. It has bicimal point and bicimal places. Examples are 10001.011, 0.1101, 10101, 1111.001, etc.  Note that the places in a bicimal can either be terminating or repeating.  **Conversion of numbers involving fractions from other bases to base 10**  In converting numbers involving fractions from other bases to base 10, we assign power to the given base according to their place value and then sum up their expansion. |  |
| STEP 4 | **APPLICATION** |  |
|  | Example 1  Convert 0.11012 to base 10.  Solution   |  |  |  |  |  | | --- | --- | --- | --- | --- | |  |  |  |  |  | | 0 | 1 | 1 | 0 | 1 |   0.11012 (0 20) (1 2–1) (1 2–2) (0 2–3) (1 2–4)  0 (1 ) (1 ) (0 ) (1 )  0    or 0.812510 (Ans)  Example 2  Convert 21.1113 to base 10.  Solution   |  |  |  |  |  | | --- | --- | --- | --- | --- | |  |  |  |  |  | | 2 | 1 | 1 | 1 | 1 |   21.1113 (2 31) (1 30) (1 3–1) (1 3–2) (1 3–3)  6 1 (1 ) (1 ) (1 )  7    or 7.481510 (Ans)  **CONVERSION FROM OTHER BASE GREATER THAN TEN TO BASE TEN**  Expansion method can be used to convert numbers in base say base thirteen to base ten. Remember in base thirteen the digits we have are 0, 1, 2, 3,4,5, 6,7,8,9, A, B, C. where A represents ten B represents eleven and C represents twelve. Letters are used for two- digits numbers less than the base thirteen.  **Example 1**  Convert 1B9thirteen to denary number  **Solution**  1B9thirteen= 1x132+Bx131+9x130  = 1x169+11x13+9x1  = 169+143+9  = 321ten  **Example 2:** Convert 20Cfifteen to a denary number  **Solution**  20Cfifteen= 2x152+0x151+12x150  = 2x225+0x15+12x1  = 450+0x15+12x1  = 462ten | The students listen to the teacher and ask questions. |
| STEP 5 | **EVALUATION** |  |
|  | The teacher evaluates the lesson with the question below:   1. Define decimal fraction and bicimals. 2. Convert 101.1012 to a number in base 10. | The students solve the problem. |
| SUMMARY AND CONCLUSION | The teacher concludes the lesson by summarising the unit lesson. |  |
| ASSIGNMENT | Convert the following bicimals to base 10:   1. 111.01 2. 10101.110 |  |
| REFERENCE | New Concept Mathematics for senior secondary school book 1 by H  . N. Odogwu, A. A. Arigbabu, et al.  New School Mathematics for senior secondary school by M. N. David-Osuagwu, Chinwa Anemelu, Ijeoma Onyeozili. |  |

**H.O.D COMMENT**…………………………………………………………….

**H,O,D SIGN……………………………………………………………………………**

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