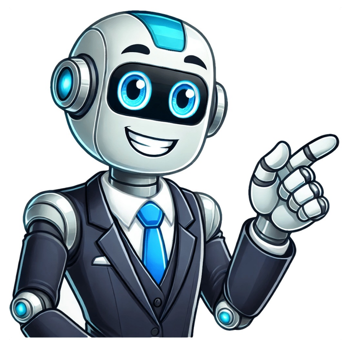

You can also use traditional long division when working with various base numbers. For instance, dividing 12343_{five} by 24_{five}: 234 ----- 24)12343 103 --- 204 132 --- 223 211 --- 12 This yields a quotient of 234_{five} and a remainder of 12_{five}. In base ten, dividing 973 by 14 resulted in a quotient of 69 and a remainder of 7. To create a multiplication table for a base other than 10 (in this case, base 6), you need to use addition and the addition table for that base. The process is similar to multiplication in base 10, where you add a number to itself a certain number of times. For example, 4 × 6 = 4 added to itself six times. The steps to create a base 6 multiplication table are: 1. Start with an empty table and fill in the numbers as you go. 2. Use repeated addition to calculate each product, such as 2 × 3 = 2 + 2 + 2 = 10 (using the base 6 addition table). 3. Continue filling in the table using repeated addition and the base 6 addition rules. The resulting multiplication table for base 6 is: * 0 1 2 3 4 5 * 0 0 0 0 0 0 * 0 1 2 3 4 5 * 2 0 2 4 10 12 14 * 3 0 3 10 13 20 23 * 4 0 4 12 20 24 32 * 5 0 5 14 23 32 41 The process is similar for creating a multiplication table for base 7. The article discusses how to create multiplication tables in different bases, specifically bases 7 and 12. It provides examples of how to calculate products in these bases using repeated addition. For base 7, the article demonstrates how to calculate 47×57 by breaking it down into smaller additions. This is done by applying the addition rules from Addition and Subtraction in Base Systems. The resulting table shows the multiplication results for numbers 0-6. For base 12, the article uses a similar approach to demonstrate how to calculate 71×91. It breaks down the calculation into smaller additions using the same addition rules. The resulting table is provided below. The article also mentions creating multiplication tables in other bases, such as base 4 and base 14. Additionally, it highlights the use of placeholder rules and carry rules when performing multiplications in non-base 10 systems. Finally, the article provides examples of how to calculate products in different bases using the multiplication tables and addition tables. Specifically, it calculates 456×246 and 1012×1102 using the base 6 and base 12 multiplication tables respectively. When performing multiplication operations in different bases, such as base 6 or base 12, one can follow similar steps as they would with base 10 numbers. The process involves using a multiplication table for the specific base being used and following standard addition rules to carry over values. For example, when multiplying two digits together in a higher base, one can use a multiplication table to determine the result. Then, adding the results of each digit's multiplication line and carrying over any necessary values will give the final answer. The same principle applies to division operations. When dividing numbers in different bases, one can follow similar steps as they would with base 10 numbers, using multiplication tables to identify the correct multiplication rule. In general, the rules for multiplying and dividing numbers in different bases are the same as those for base 10 numbers. The key is to use the correct multiplication table and apply standard addition rules to carry over values. The text also mentions that errors can occur when performing arithmetic operations in bases other than 10, similar to how they occur with base 10 numbers. These errors often involve applying base 10 rules or symbols to an arithmetic problem in a different base. Given article text here The first type of error in arithmetic operations with different bases is using an incorrect symbol from the base's symbol set. For example, in a calculation involving base 6, the use of the number 8 as a digit is not valid since the available symbols are only 0 through 5. For instance, the correct product for $46_{6}\times26_{6}=126_{6}$ indicates that the error lies in the calculation $13_{4}\times21_{4}=54_{4}$. This would be incorrect if performed with base 10 rules. In contrast, in base 17, using the rule $6\times9=54$ would produce an incorrect result. To identify errors in base conversion calculations, it is essential to use the correct multiplication table for the specific base involved. For example, when converting between bases 12 and 10, one must carefully apply the corresponding multiplication tables. The Octal and Hexadecimal systems are alternative ways to represent numbers in computers and digital electronics. The Octal system uses base-8 digits (0-7) and groups binary numbers into sets of three bits, making it easier to work with. The Hexadecimal system uses base-16 digits (0-9, A-F) and represents every 4 bits as one digit. A number in a given base or radix can be written using the formula: (N)b = dn-1 ... d1 d0 . d-1 ... d-m The text then explains how to convert numbers between different systems: 1. Decimal to Binary Conversion: * For integer part, divide by 2 and record remainder (0 or 1), repeating until quotient is 0. * For fractional part, multiply by 2 and record integer part (0 or 1), repeating until fractional part becomes 0. Example: Converting (10.25)10 to binary gives (1010.01)2 2. Binary to Decimal Conversion: * For integer part, write down the binary number and multiply each digit by 2 raised to its position, then add up the results. * For fractional part, write down the binary fraction and multiply each digit by 2 raised to its negative position, then add up the results. Example: Converting (1010.01)2 to decimal gives (10.25)10 3. Decimal to Octal Conversion: * For integer part, divide by 8 and record remainder (0-7), repeating until quotient is 0. * For fractional part, multiply by 8 and record integer part (0-7), repeating until fractional part becomes 0 or reaches desired precision. Example: Converting a decimal number to octal would involve these steps. 1. Converting Octal to Decimal Number System In octal sequence, like in example (10.25)10 For Integer Part (10): Divide 10 by 8 → Quotient = 1, Remainder = 2 Then, Divide 1 by 8 → Quotient = 0, Remainder = 1 The Octal equivalent of the integer part 10 is 12 For Fractional Part (0.25): Multiply 0.25 by 8 → Result = 2.0, Integer part = 2 The octal equivalent of the fractional part 0.25 is 0.2. The octal equivalent of (10.25)10 = (12.2)8 2. Octal to Decimal Number System Conversion For Integer Part: Write down the octal number. Multiply each digit by 8 raised to the power of its position, starting from 0 (rightmost digit). Add up the results of these multiplications. The sum is the decimal equivalent of the octal integer For Fractional Part: Multiply each digit by 8 raised to the negative power of its position, starting from -1 (first digit after the decimal point). Add up the results of these multiplications. The sum is the decimal equivalent of the octal fraction. Example: (12.2)8 = (10.25)10 3. Decimal to Hexadecimal Number System Conversion For Integer Part: Divide the decimal number by 16. Record the remainder (0-9 or A-F). Continue dividing the quotient by 16 until the quotient is 0. The hexadecimal equivalent is the remainders read from bottom to top For Fractional Part: Multiply the fractional part by 16. Record the integer part (0-9 or A-F). Take the fractional part of the result and repeat the multiplication. Continue until the fractional part becomes 0 or reaches the desired precision The hexadecimal equivalent is the integer parts recorded in sequence Example: (10.25)10 Integer part: 10 ÷ 16 = 0, Remainder = A (10 in decimal is A in hexadecimal) Hexadecimal equivalent = A Fractional part: 0.25 × 16 = 4, Integer part = 4 Hexadecimal equivalent = 0.4 Thus, (10.25)10 = (A.4)16 4. Hexadecimal to Decimal Number System Conversion For Integer Part: Write down the hexadecimal number. Multiply each digit by 16 raised to the power of its position, starting from 0 (rightmost digit). Add up the results of these multiplications. The sum is the decimal equivalent of the hexadecimal integer For Fractional Part: Write down the hexadecimal fraction. Multiply each digit by 16 raised to the negative power of its position, starting from -1 (first digit after the decimal point). Add up the results of these multiplications. The sum is the decimal equivalent of the hexadecimal fraction Example: (A.4)16 = (10.25)10 5. Hexadecimal to Binary Number System Conversion To convert from Hexadecimal to Binary: Each hexadecimal digit (0-9 and A-F) is represented by a 4-bit binary number For each digit in the hexadecimal number, find its corresponding 4-bit binary equivalent and write them down sequentially Example: (3A)16 = (0011)2 × 16 + (1010)2 Thus, (3A)16 = (00111010)2 6. Binary to Hexadecimal Number System Conversion Start from the rightmost bit and divide the binary number into groups of 4 bits each If the number of bits isn’t a multiple of 4, pad the leftmost group with leading zeros Each 4-bit binary group To convert a binary number to hexadecimal, replace each 4-bit group with the corresponding hexadecimal digit. For example, (1111011011)2 becomes (3DB)16 by breaking it down into groups: 0011 1101 1011, and then converting each group to hexadecimal. To convert from binary to octal, divide the number into groups of 3 bits starting from the rightmost bit. If necessary, add leading zeros to make the total length a multiple of 3. Then, replace each 3-bit binary group with its corresponding octal digit using the conversion chart: 000 = 0, 001 = 1, 010 = 2, 011 = 3, 100 = 4, 101 = 5, 110 = 6, and 111 = 7. To convert from octal to binary, replace each octal digit with its corresponding 3-bit binary equivalent. For example, (153)8 becomes (001101011)2 by converting each digit: 1 = 001, 5 = 101, and 3 = 011. A number system is a method to represent numbers mathematically using arithmetic operations. To convert a number, you need to divide it by the given base and note down the remainder at each step. The steps are: STEP 1 – Divide the number with the given base. STEP 2 – Note down the resulting remainder. STEP 3 – Divide the quotient again by the given base.

Number bases. Number system division. Division of number bases. What is number base system. Division of number bases examples.