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### **Binary Arithmetic Operations**

Like we perform the arithmetic operations in numerals, in the same way, we can perform addition, subtraction, multiplication and division operations on Binary numbers. Let us learn them one by one.

# **Binary Addition**

Adding two binary numbers will give us a binary number itself. It is the simplest method. Addition of two single-digit binary number is given in the table below.

Binary Numbers		Addition
0	0	0
0	1	1
1	0	1
1	1	0; Carry →1

Let us take an example of two binary numbers and add them.



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**For example:** Add 1101<sub>2</sub> and 1001<sub>2</sub>.

**Solution:** 

1101 +1001 10110

# **Binary Subtraction**

Subtracting two binary numbers will give us a binary number itself. It is also a straightforward method. Subtraction of two single-digit binary number is given in the table below.

Binary Numbers		Subtraction
0	0	0
0	1	1; Borrow 1
1	0	1
1	1	0

Let us take an **example** of two binary numbers and subtract them: Subtract 1101<sub>2</sub>, and 1010<sub>2</sub>.

**Solution:**  $1101_2 - 1010_2 = 0011_2$ 

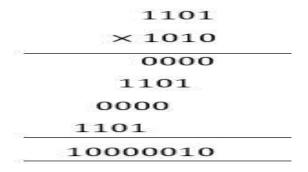


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# **Binary Multiplication**

The multiplication process is the same for the binary numbers as it is for numerals. Let us understand it with example.

**Example:** Multiply 1101<sub>2</sub> and 1010<sub>2</sub>.



# **Binary Division**

The binary division is similar to the decimal number division method. We will learn with an example here.

Example: Divide 1010<sub>2</sub> by 10<sub>2</sub>

10)1010(101
10
010
10
0

### <u>Uses of Binary Number System</u>

Binary numbers are commonly used in computer applications. All the coding and languages in computers such as C, C++, Java, etc. use binary digits 0 and 1 to write a program or encode any



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digital data. The computer understands only the coded language. Therefore these 2-digit number system is used to represent a set of data or information in discrete bits of information.

### **Problems and Solutions**

Let us practice some of the problems for better understanding:

Question 1: What is binary number 1.1 in decimal?

Solution:

Step 1: 1 on the left-hand side is on the one's position, so it's 1.

Step 2: The one on the right-hand side is in halves, so it's

 $1 \times \frac{1}{2}$ 

**Step 3:** so, 1.1 = 1.5 in decimal.

**Question 2: Write 10.11<sub>2</sub> in Decimal?** 

Solution:

 $10.11 = 1 \times (2)^{1} + 0 (2)^{0} + 1 (\frac{1}{2})^{1} + 1(\frac{1}{2})^{2}$ 

 $= 2 + 0 + \frac{1}{2} + \frac{1}{2}$ 

= 2.75

So, 10.11 is 2.75 in Decimal.

Next >>> let us understand how the interconversions between these systems are done. القادم >>> دعونا نفهم كيف تتم التحويلات البينية بين هذه الأنظمة