**Binary Conversion**

Now, the next question is **How do we know what numbers to fill in each of the 6 cards?** This is the fun part. This process is divided into two steps.

First of all, all the numbers are converted between 1 and 63 into its binary notation. In other words, we have to decompose a number into its binary digits.

29347

is expressed as

29347 = 2 \times 10^4 + 9 \times 10^3 + 3 \times 10^2 + 4 \times 10^1 + 7 \times 10^0

thus 29347 = 20000 + 9000 + 300 + 40 + 7

Using this knowledge, we will convert a decimal number into its binary notation. Let's say we want to convert 29 into its binary notation, then you have to continuously divide it by 2 until you reach the quotient equal to 0.

- 29, when divided by 2, leaves a quotient 14 and remainder 1.

- 14, when divided by 2, leaves a quotient 7 and remainder 0.

- 7, when divided by 2, leaves a quotient 3 and remainder 1.

- 3, when divided by 2, leaves a quotient 1 and remainder 1.

Now, the division process stops because we have reached a quotient equal to 0. The last remainder obtained through the repeated division process is called the **most significant bit (MSB)** and the first remainder obtained is called the **least significant bit (LSB)**.

So, by arranging the remainders from MSB to LSB, i.e,

11101

, we will get the binary notation of a decimal number. The number 29 has 5 digits in binary notation, i.e,

1, 1, 1, 0, 1

. So to get the decimal number back from its binary notation, the first digit is multiplied with

2^{n - 1}

, where

n

is the number of digits in the binary notation. The second digit is multiplied with

2^{n - 2}

, the third digit is multiplied with

2^{n-3}

and so on

The last digit is multiplied with

2^0 = 1

. Finally, all these products are added together as shown below.

29 = 1 \times 2^4 + 1 \times 2^3 + 1 \times 2^2 + 0 \times 2^1 + 1 \times 2^0

thus 29 = 16 + 8 + 4 + 0 + 1