

Class 11th | Applied Maths



→ CLASS

→ DPP

Unit : 1

Numbers

**Binary
Numbers**

BINARY NUMBERS

Base 2

0 1



$$1 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 1 \times 2^0$$

$$8 + 0 + 2 + 1$$

11

DECIMAL NUMBERS

Base 10

0, 1, 2, 3, 4, ..., 9

$(7302)_{10}$

$$7000 + 300 + 0 + 2$$

$$7 \times 10^3 + 3 \times 10^2 + 0 \times 10^1 + 2 \times 10^0$$

$$1 \times 2^3 + 1 \times 2^2 + 0 \times 2^1 + 1 \times 2^0$$

$$11001 \rightarrow 2^4 + 2^3 + 0 + 0 + 2^0 = 16 + 8 + 1 = 25$$

Convert the following binary numbers to the decimal numbers:

(i) 11001

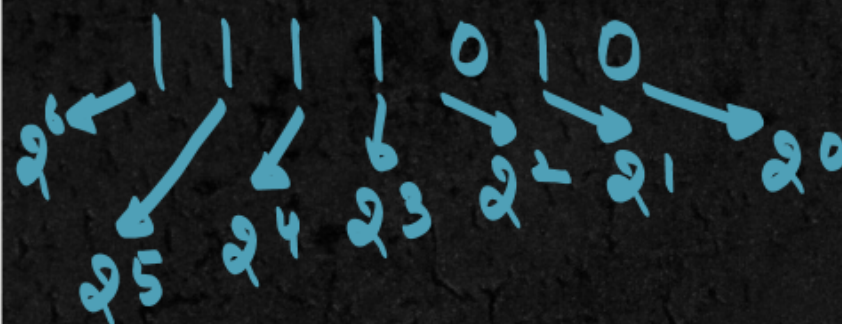
(ii) 1111010

(iii) 110011101



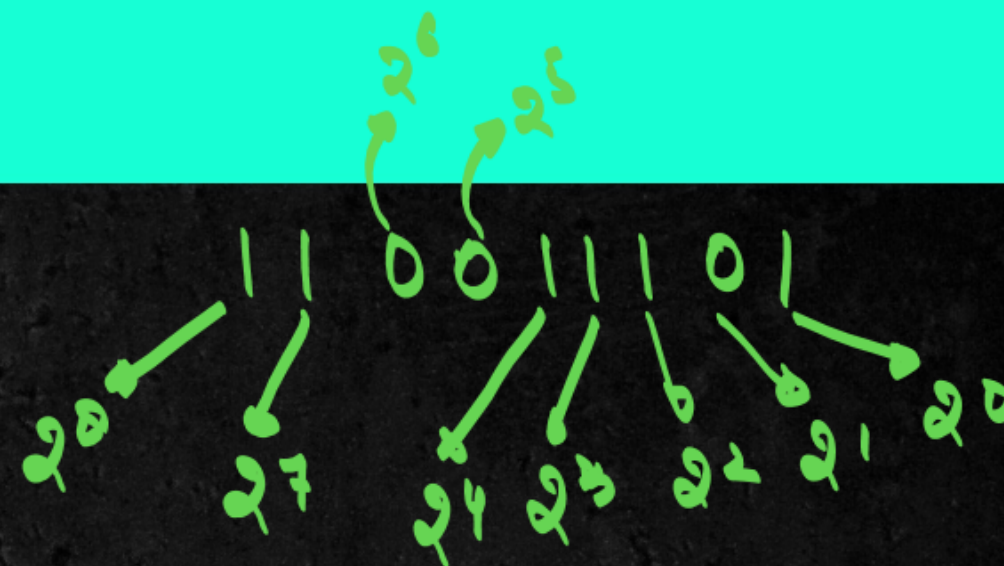
$$8 + 4 + 0 + 1$$

13



$$64 + 32 + 16 + 8 + 0 + 2 + 0$$

122



$$256 + 128 + 0 + 0 + 16 + 8 + 4 + 0 + 1$$

413

Convert the following decimal numbers to the binary numbers:

(i) 8

(ii) 12

(iii) 63

(iv) 569

2	8	R
2	4	0
2	2	0
	1	0

$(1000)_2$

2	12	R
2	6	0
2	3	0
	1	1

$(1100)_2$

2	63	R
2	31	1
2	15	1
2	7	1
2	3	1
	1	1

$(111111)_2$

2	569	R
2	284	1
2	142	0
2	71	0
2	35	1
2	17	1
2	8	1
2	4	0
2	2	0
	1	0

$(1000111001)_2$

ADDITION ON BINARY

$$0 + 0 = 0 \checkmark$$

$$0 + 1 = 1 \checkmark$$

$$1 + 0 = 1 \checkmark$$

$$1 + 1 = 0 \text{ [CARRY TO NEXT]}$$

Add the following binary numbers and check the result by converting them to decimal system:

(i) 10001 and 1101

(ii) 10111 and 1111

(iii) 1000011 and 110100

(iv) 10000000 and 1011010

Handwritten solution for (i) 10001 and 1101:

$$\begin{array}{r}
 10001 \\
 + 1101 \\
 \hline
 11101
 \end{array}$$

Conversion to decimal:

10001: $2^4 + 0 + 0 + 0 + 1 = 17$

1101: $2^3 + 2^2 + 0 + 1 = 13$

Sum: $17 + 13 = 30$

Verification of the sum:

$$\begin{array}{r}
 2^4 + 2^3 + 2^2 + 2^1 + 0 \\
 16 + 8 + 4 + 2 + 0 \\
 \hline
 30
 \end{array}$$

Handwritten solution for (iv) 10000000 and 1011010:

$$\begin{array}{r}
 10000000 \\
 + 1011010 \\
 \hline
 11011010
 \end{array}$$

Conversion to decimal:

10000000: $2^7 + 0 + 0 + 0 + 0 + 0 + 0 + 0 = 128$

1011010: $2^6 + 0 + 2^4 + 2^3 + 2^1 + 0 = 62$

Sum: $128 + 62 = 190$

Verification of the sum:

$$\begin{array}{r}
 2^7 + 2^6 + 2^4 + 2^3 + 2^1 + 0 \\
 128 + 64 + 16 + 8 + 2 + 0 \\
 \hline
 190
 \end{array}$$

SUBTRACTION ON BINARY

$$0 - 0 = 0$$

$$1 - 0 = 1$$

$$1 - 1 = 0$$

$$* 0 - 1 = 1 \quad \text{[BORROW]}$$

$$* 10 - 1 = 1$$

Subtract the following binary numbers and check the result by converting them to decimal system:

(i) 101 from 110

(ii) 11010 from 110101

$$\begin{array}{r}
 110 \\
 - 101 \\
 \hline
 001
 \end{array}$$

$110 \rightarrow 2^2 + 2^1 + 0 = 6$
 $101 \rightarrow 2^2 + 0 + 1 = 5$
 $6 - 5 = 1$
 $2^0 = 1$

$$\begin{array}{r}
 110101 \\
 - 11010 \\
 \hline
 10101
 \end{array}$$

$110101 \rightarrow 2^5 + 2^4 + 0 + 2^2 + 0 + 2^0 = 53$
 $11010 \rightarrow 2^4 + 2^3 + 0 + 2^2 + 2^0 = 26$
 $53 - 26 = 27$
 $2^4 + 2^3 + 0 + 2^2 + 2^0 = 16 + 8 + 2 + 1 = 27$

BINARY MULTIPLICATION

$$0 \times 0 = 0$$

$$0 \times 1 = 0$$

$$1 \times 0 = 0$$

$$1 \times 1 = 1$$

$$128 + 32 + 16 + 4 + 2$$

$$\underline{182}$$

$$26 \times 7 = \underline{182}$$

Multiply the following binary runibers and check the result by converting them to decimal system:

(i) 1001 and 101

(ii) 11010 and 111

$$\begin{array}{r}
 1001 \rightarrow 2^3 + 0 + 0 + 2^0 = 9 \\
 101 \rightarrow 2^2 + 0 + 2^0 = 5 \\
 \hline
 1001 \\
 0000 \times \\
 1001 \times \times \\
 \hline
 101101 \rightarrow 2^5 + 0 + 2^3 + 2^2 + 0 + 2^0 \\
 32 + 8 + 4 + 0 + 1 \\
 \underline{45}
 \end{array}$$

$$\begin{array}{r}
 11010 \rightarrow 2^4 + 2^3 + 0 + 2^1 + 0 = 26 \\
 111 \rightarrow 2^2 + 2^1 + 2^0 = 7 \\
 \hline
 11010 \\
 11010 \times \\
 11010 \times \times \\
 \hline
 10110110 \\
 2^7 + 0 + 2^5 + 2^4 + 0 + 2^2 + 2^1 + 0
 \end{array}$$

BINARY DIVISIONS

$$1 \div 0 = \text{ND}$$

$$0 \div 0 = \text{ND}$$

$$0 \div 1 = 0$$

$$1 \div 1 = 1$$

$$9 \overline{) 117} \begin{array}{r} 13 \\ 9 \\ \hline 117 \\ 90 \\ \hline 27 \end{array}$$

Divide the following binary numbers and check the result by converting them to decimal system:

(i) 10111 by 111

(ii) 1110101 by 1001

Also, write quotient and remainder in each case.

Handwritten solution for (i) 10111 by 111:

Conversion of 111 to decimal: $2^2 + 2^1 + 0 = 6$

Conversion of 10111 to decimal: $4 + 2 + 1 + 1 + 1 = 10$

Long division:

$$\begin{array}{r} 10111 \\ \underline{111} \\ 1001 \\ \underline{111} \\ 101 \\ \underline{111} \\ 0 \end{array}$$

Quotient: 101, Remainder: 0

Check: $6 \times 10 = 60$

Conversion of 101 to decimal: $2^2 + 0 + 2^0 = 5$

Conversion of 60 to decimal: $32 + 8 + 4 + 2 + 1 = 47$

Final result: Quotient = 5, Remainder = 0

Handwritten solution for (ii) 1110101 by 1001:

Conversion of 1001 to decimal: $8 + 1 = 9$

Conversion of 1110101 to decimal: $64 + 32 + 16 + 4 + 1 = 117$

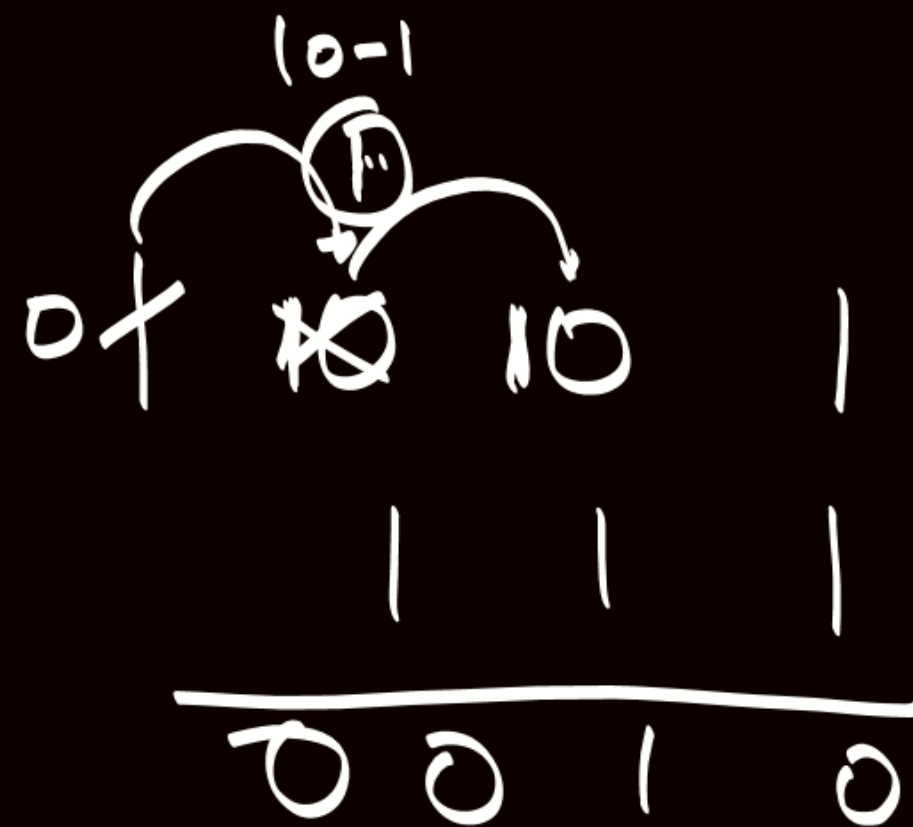
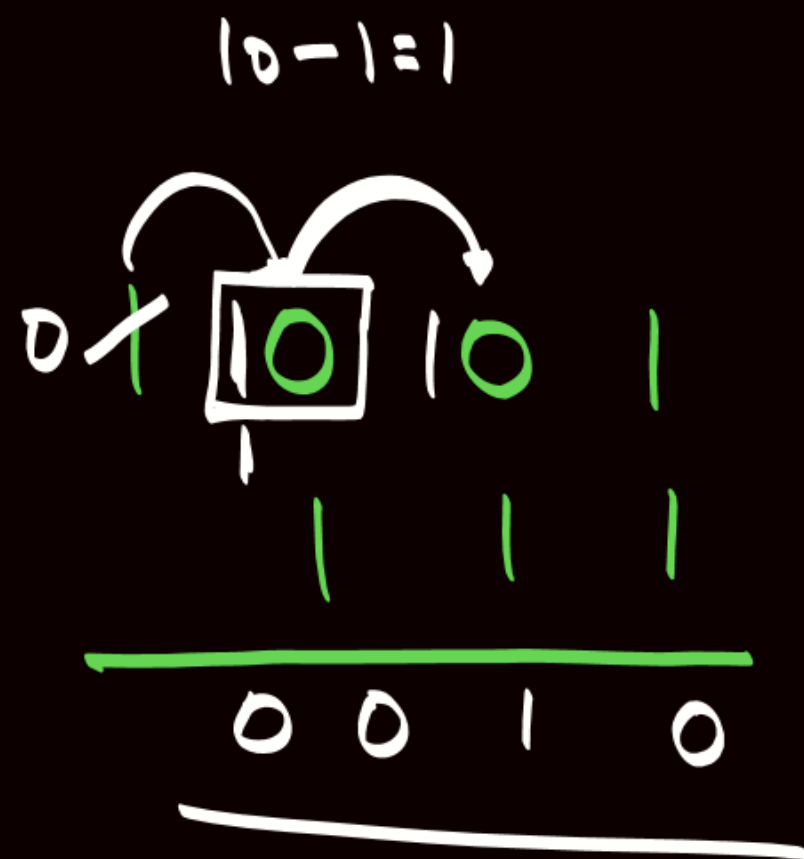
Long division:

$$\begin{array}{r} 1110101 \\ \underline{1001} \\ 1011 \\ \underline{1001} \\ 1001 \\ \underline{1001} \\ 0 \end{array}$$

Quotient: 1101, Remainder: 0

Check: $9 \times 13 = 117$

Final result: Quotient = 13, Remainder = 0



$$8+2+1$$

$$11$$

$$2+1=3$$

1011

101010

$$32+8+2=42$$

1011

101000

1011

1001

9

$$\begin{array}{r} 0101010 \\ 1011 \\ \hline 10001 \end{array}$$

$$\begin{array}{r} 3 \\ 11 \overline{) 42} \\ \underline{33} \\ 9 \end{array}$$

STAY CONNECTED

KEEP LEARNING

Thank You



Join our telegram channel
@NEXTTOPPERS_COMMERCE1

