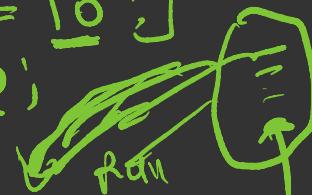
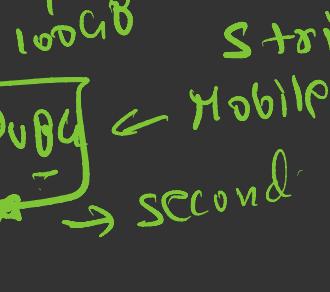



[let num = 10]
let as = 20;



Number
String
BigInt
Boolean

Data generate
10, 20, 30
Instagram;
String .



RAM -

① Number: 10, 20, -30, 50,

10.8, 19.68

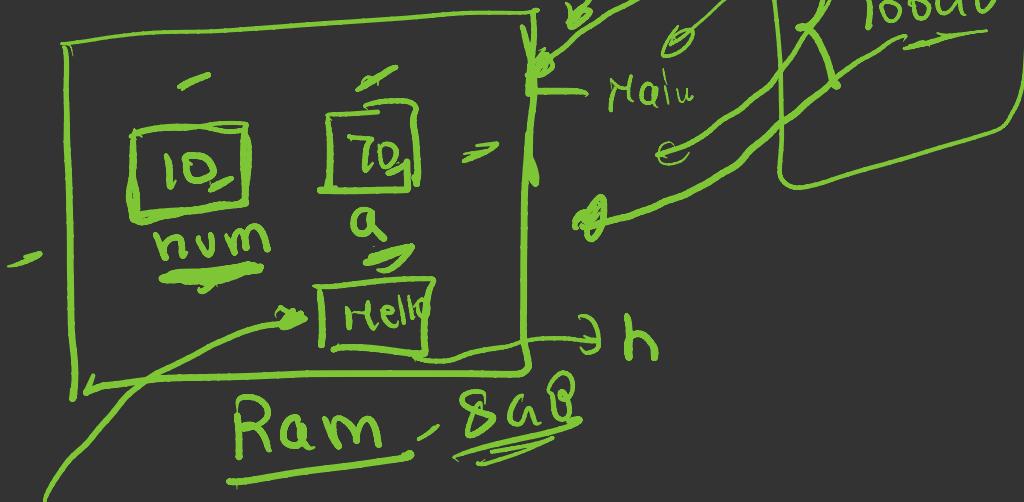


② String: "Rohit" →
"Mohit"

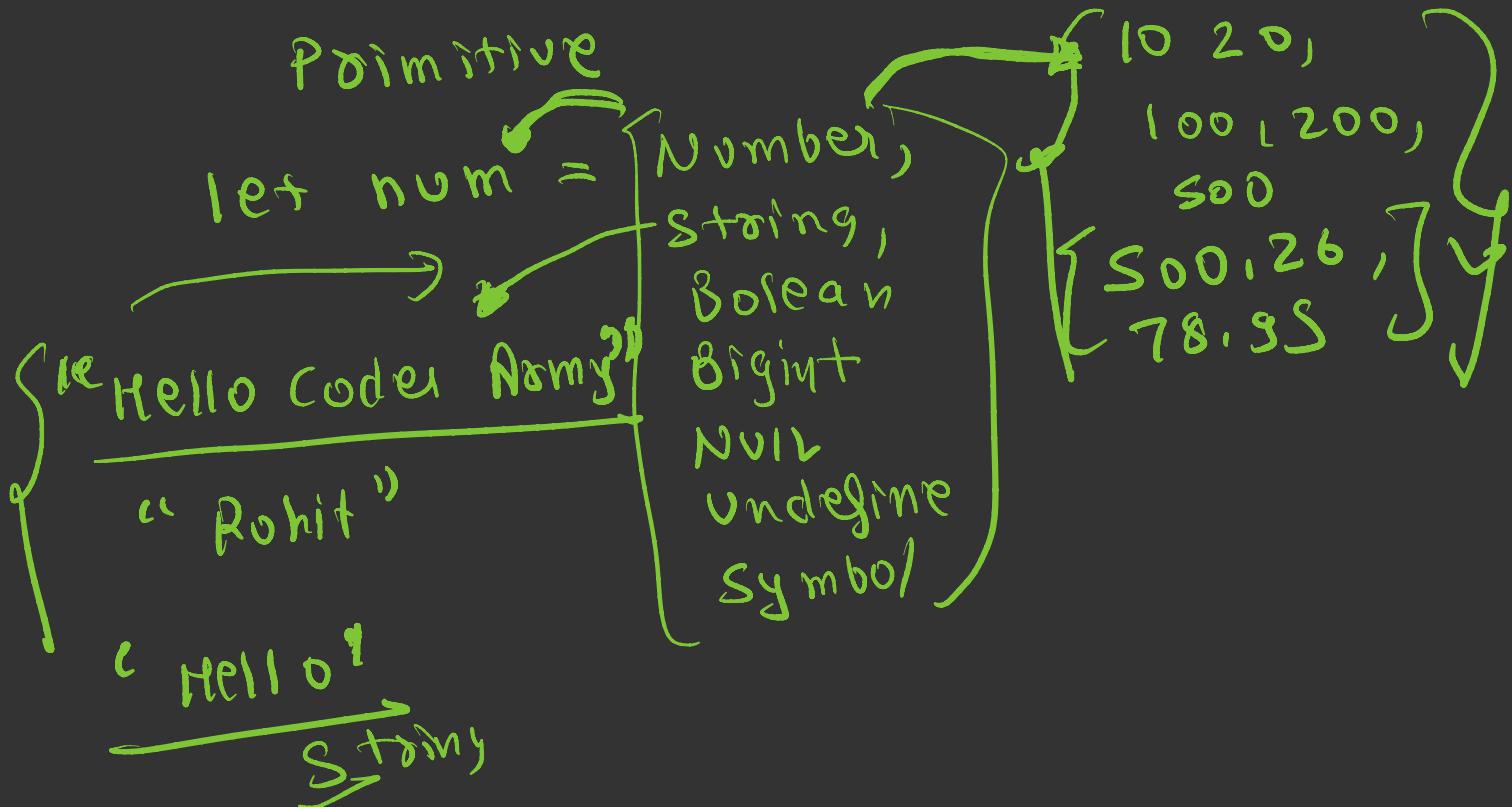
"Hello Coder Army"

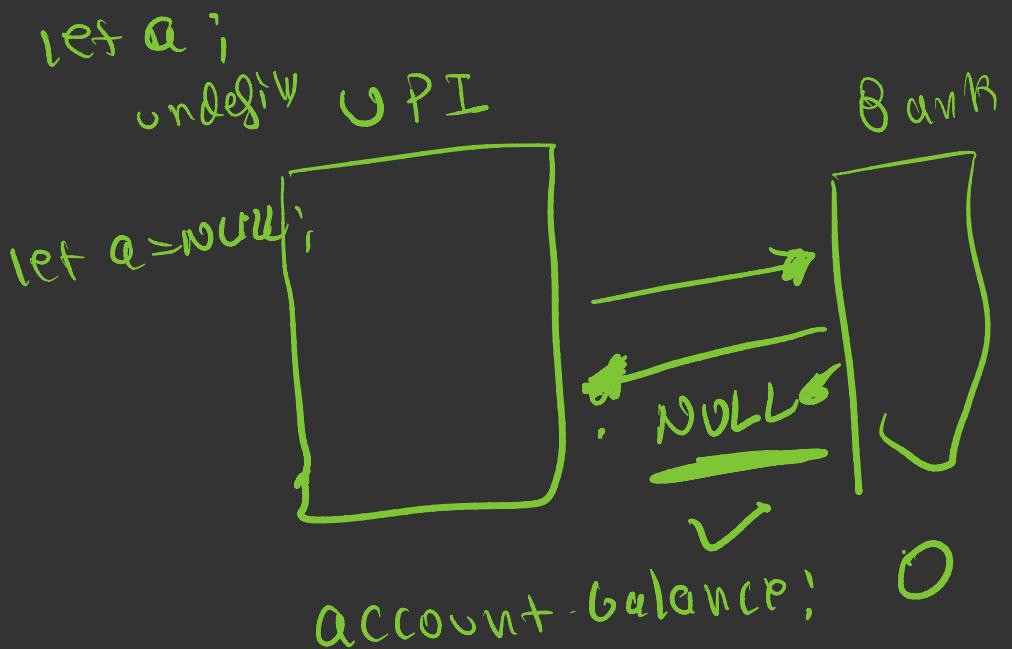
sin
c Hello Coder

$\rightarrow \text{let } \underline{\text{num}} = \underline{10};$
 $\rightarrow \text{let } \underline{a} = \underline{70};$



$\text{let } h = \text{"Hello"};$





NULL
undefined

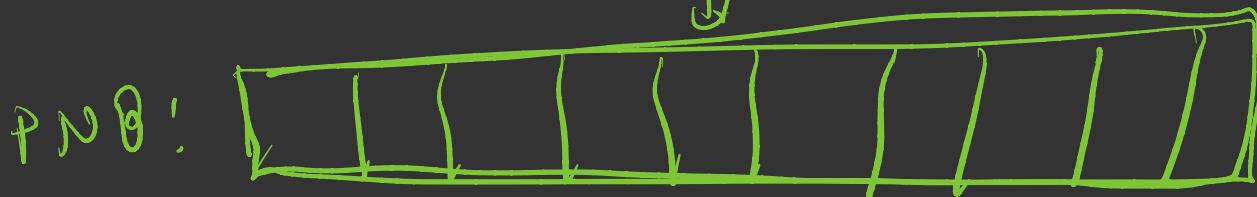
②

Number : 64 bit
Let $a = 10$
 $a = 4893612985120h$



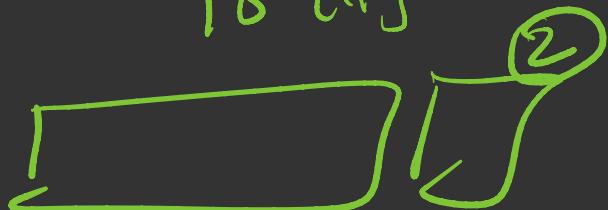
10 : 1010 4bit

17 : 10001 : 5bit
↓



← 16 →

18 digit Bar



Binary \hookrightarrow

a \hookrightarrow 64 bit

Number

1 1 1

3 bit

Largest

0 0 0

0

Smallest

$\frac{0}{1}$ $\frac{1}{0}$

$\Rightarrow + [3]$

✓

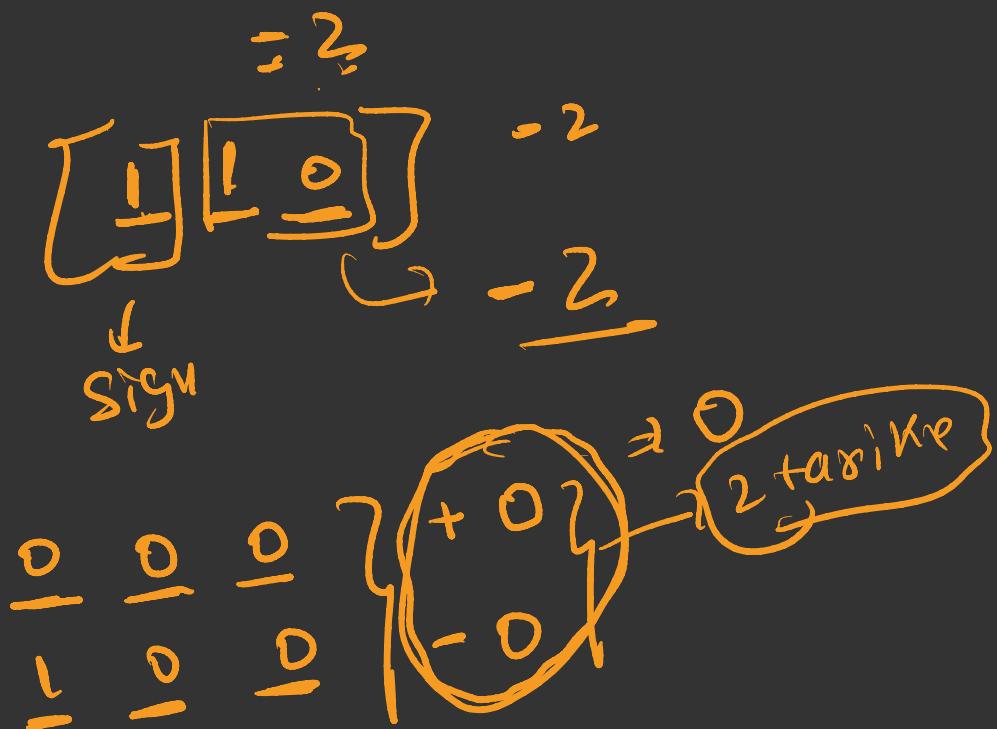
$\frac{3}{0} \frac{2}{1} \frac{1}{0}$

sign bit

0 +ve

1 \rightarrow -ve sign

$\frac{-1}{1} \frac{1}{1} \Rightarrow -3$ ✓



{
 0 0 0
 0 0 1
 0 1 0
 1 0 0

1 1 1 {3 bit
 $2 \times 2 \times 2^{3-1}$

$$2^3 = \frac{8 \text{ Number}}{2} \rightarrow +ve = 4^{-1}$$

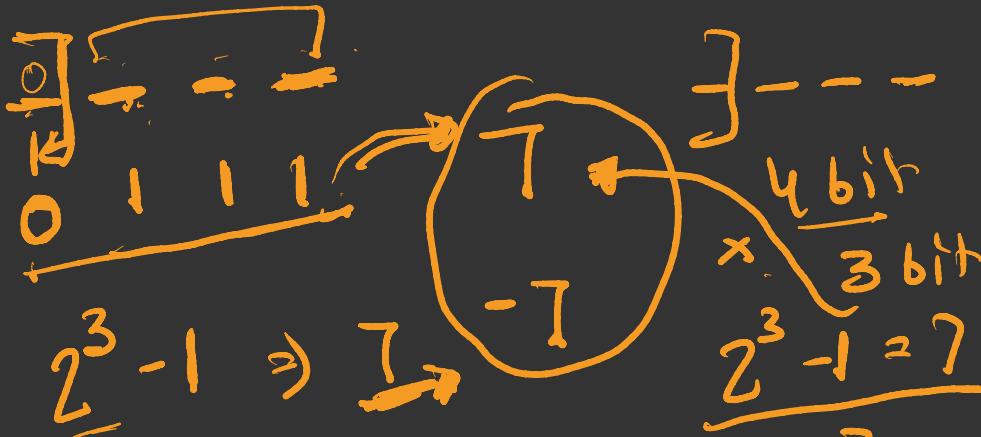
$$\rightarrow -ve \rightarrow 4^{-1} \rightarrow 0 - 3$$

+3 →
 -3

0 - 3

$(2^{3-1} - 1)$ +ve number
 - $(2^{3-1} - 1)$ -ve number

$$2^3 - 1$$

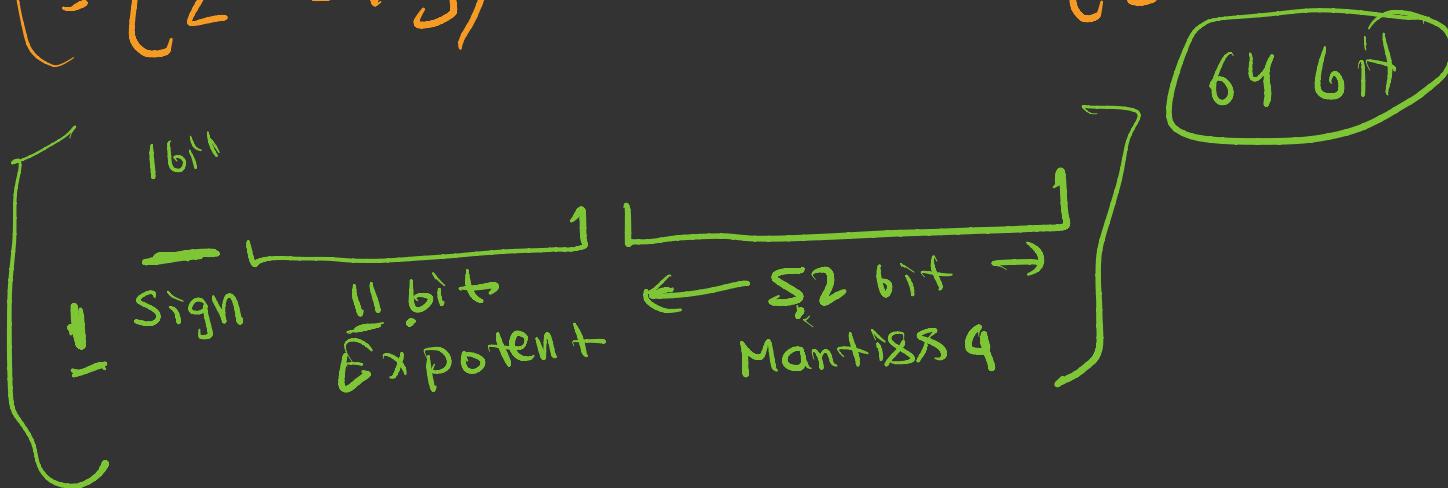


$$2^3 - 1 \Rightarrow \top$$
$$-(2^3 - 1) = -\top - (2^3 - 1) \Rightarrow -\top$$
$$\overline{2^3 - 1 = 7}$$

$$\left(\left[2^{53} - 1 \right] \times \right. \\ \left. - \left[2^{53} - 1 \right] \right)$$

64 bit = 16 bit + 63

$\left[2^{63} - 1 \right]$ Integer
 $\left[2^{63} - 1 \right]$ Min X



42.75

2	42	
2	21	0
2	10	1
2	5	0
2	2	1
2	1	0
2	0	1

10

→ 64 JS

42: 101010.11

$$.75 \times 2 = 1.5$$

$$.5 \times 2 = 1.0$$

$\therefore 0 \times 2 = .0$

$\overline{1 \ 0 \ 1 0 \ 1 0 : 1 1} \rightarrow \text{Exponent}$

52 bit

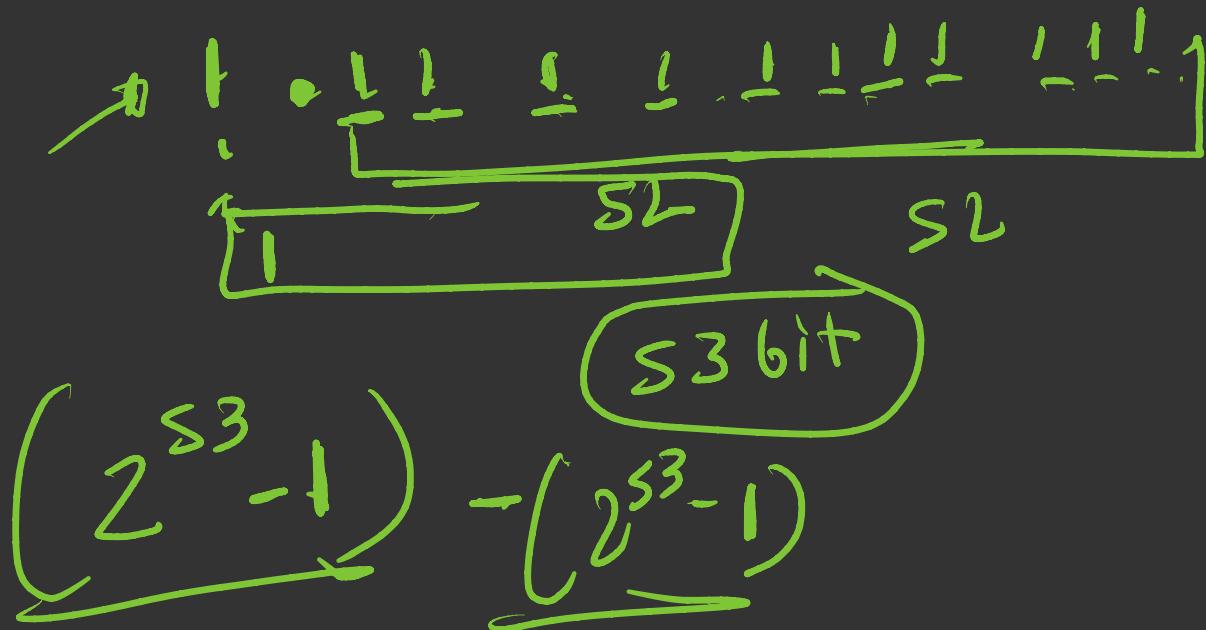
$$1 : \boxed{010101} \times 2 \xrightarrow{(5)} \begin{array}{r} 1023 \\ + 5 \\ \hline 1028 \end{array} \xrightarrow{\text{actC}}$$

Diagram illustrating the IEEE 754 single precision floating-point format:

- Sign Bit:** The first bit (leftmost) indicates the sign of the number.
- Exponent:** The next 8 bits represent the exponent.
- Mantissa:** The remaining 23 bits represent the fraction part of the number.

The diagram shows the binary representation of the number 1.000000100... followed by a separator bar, and then the binary representation of 010101100000000. A bracket under the first 8 bits is labeled "exponent". A bracket under the remaining 23 bits is labeled "mantissa". An arrow points to the first bit of the mantissa field with the label "sign bit".

- ① Binary convert
- ② Move decimal to left side,



$$1.0 \begin{array}{|c|c|c|c|c|c|c|c|}\hline & | & | & | & | & | & | & | \\ \hline \end{array} 1_2 \times 2^{S-2}$$

→ Σ 1010110000000 0 —

\leftarrow exponent \rightarrow | \leftarrow 52 bit \rightarrow

Mantissa

$101010.11 \Rightarrow 42.75$
 $1.011011 \times 2^5 = 42.75$
 $2^{s_3} - 1$
 $2^{s_3} - 1$
 $\boxed{1}$
 $111111\dots1 \times 2^{s_2}$
 $\Rightarrow (2^{s_3} - 1)$

Q)

$\overline{\dots\overline{0}}$
 $2^3 \cdot 1 =$
 11110110000000
mantissa

Cxponent

$2^{63} - 1 \Rightarrow$

INT

Cx1

0.75

63

0.68

$[6.8 \times 10^{-1}]$

0.75

$0.1.1$

$1.1 \times 2^{-1} \Rightarrow 0.75$

$1023 - 1$

1022

Mantissa

0.101011

$$\left[1.01011 \times 2^{-1} \right]$$

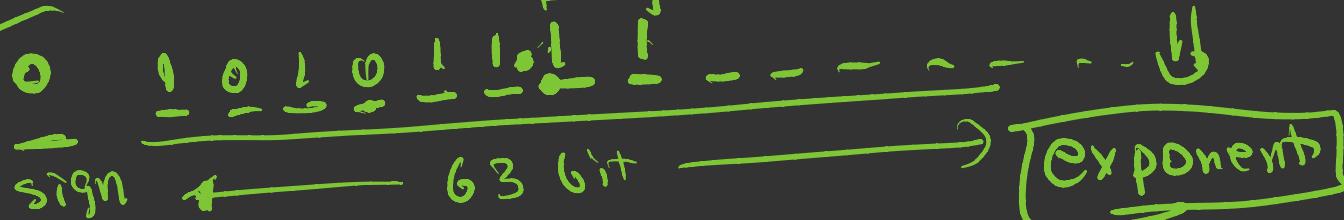
0.000010101

$$\left(1.0101 \times 2^{-5} \right) \checkmark$$

mantissa

64 bit

z digit geht



42.75

101011.11

$1.0101011 \times 2^{1023+5}$

(01010,1)

1023 + 5

exponent

A handwritten diagram illustrating the floating-point representation of a number. On the left, a large oval encloses the integer part '1023' and the fraction part '+5'. Above this oval, a brace groups the digits '10101011' and the decimal point '010101011'. To the right of the decimal point, another brace groups the digit '1' and the exponent '1023'. A small circle contains the letter 'S', which is connected by a line to a bracket labeled 'exponent'. Below the main expression, a large bracket groups the entire sequence '1.0101011' and the multiplier '2^1023+5'.

-20

Exponent [11 bit]

Sign [1 bit]

[1 0 0 0 0 0 1 0 1 0 0]

Sign [11]
Exp

$\underline{1} \underline{0} \underline{1} \underline{0} \underline{0} \underline{0} \underline{1} \underline{1} \underline{1} \underline{1}$

1023

(102)

2^5

2^{10}

2^{20}

2^{40}

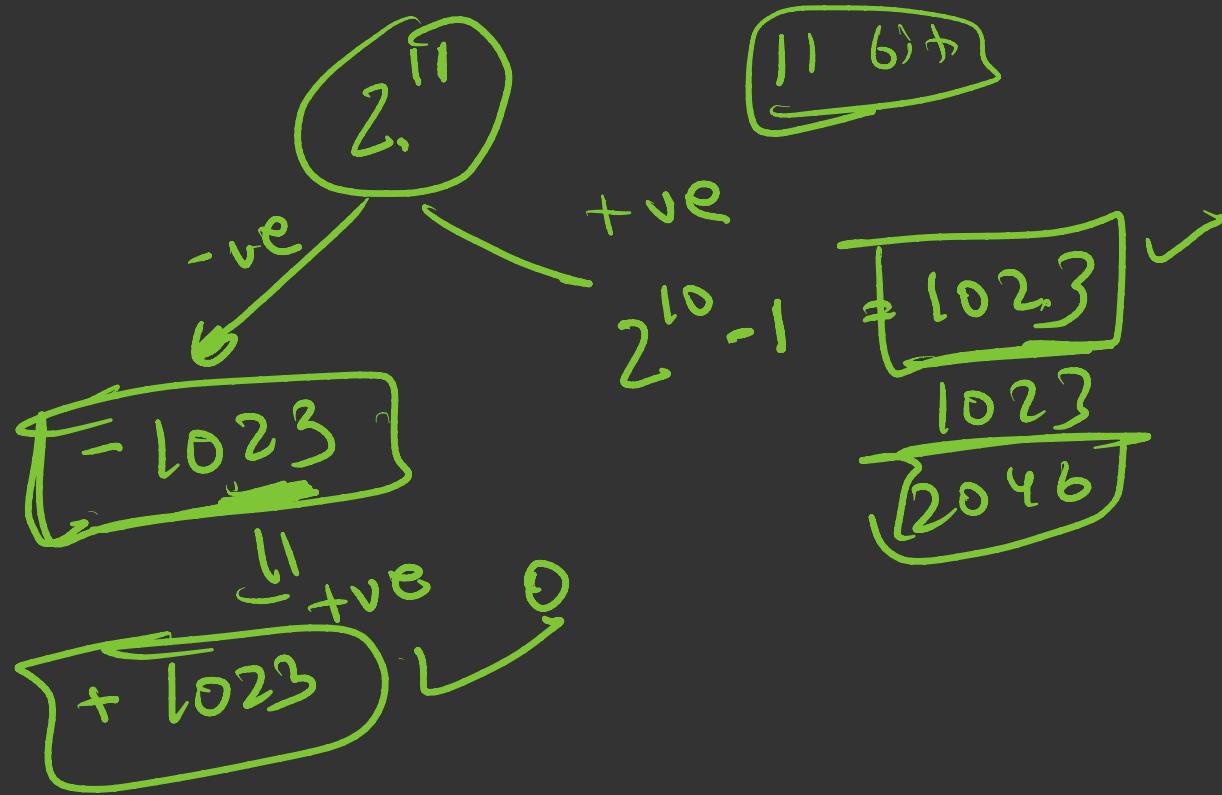
2^{80}

2^{160}

2^{-20}

2^{-12}

2^{-5}



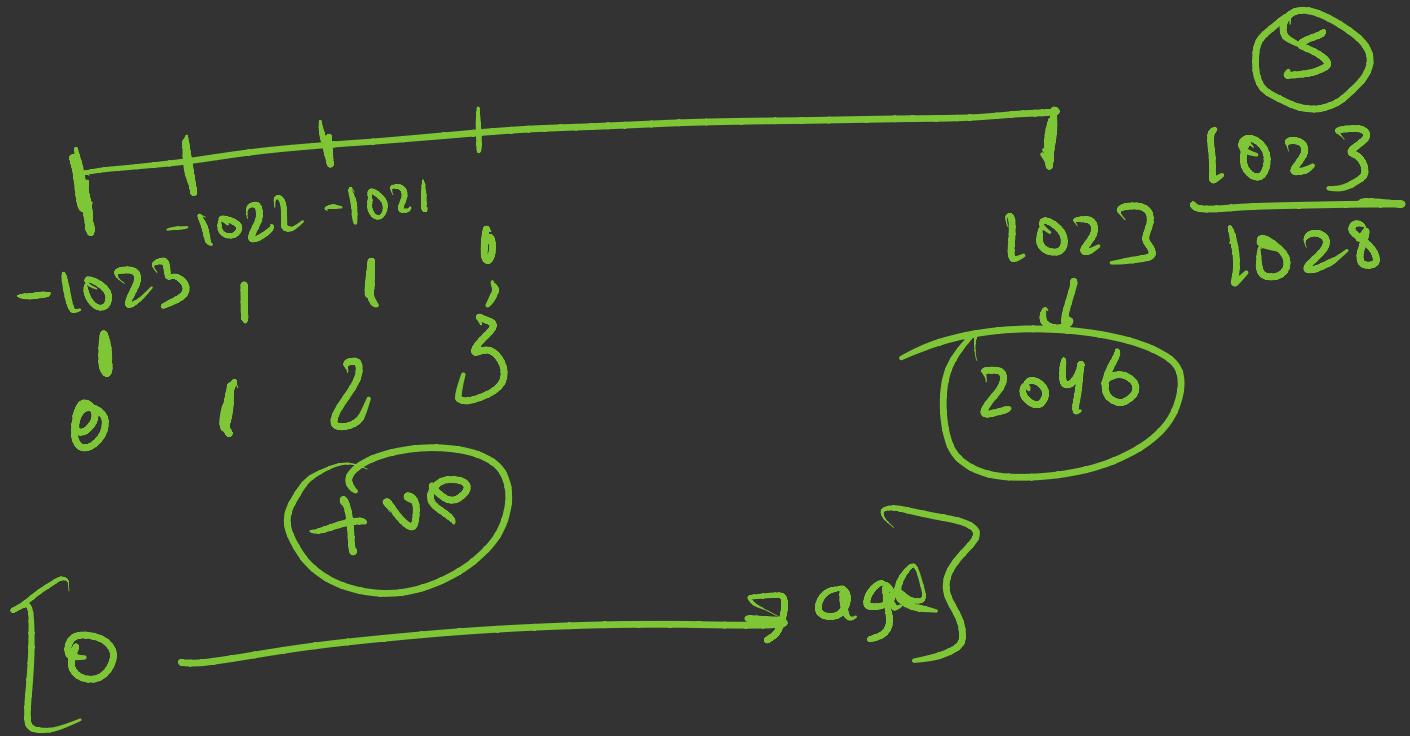


Diagram illustrating the two's complement representation of -1023:

- The number -1023 is shown as a sequence of bits: $1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1$.
- A bracket labeled "Sign-bit" covers the first bit (the most significant bit).
- A bracket labeled " ~ 1023 " covers the remaining 15 bits.
- A callout box highlights the first two bits as 11 , which is labeled 11611 .

-3	-2	-1	0	1	2	3	0
0	0	0	0	1	1	1	1
0	0	0	1	1	1	1	1
0	0	1	0	1	2	2	2
0	1	0	0	1	3	3	3
0	1	1	1	1	3	3	3
1	0	0	0	1	-0	-0	-0
1	0	0	1	1	-1	-1	-1
1	1	0	0	1	-2	-2	-2
1	1	1	1	1	-3	-3	-3

4 position

11 bit

$$2^{11-1} - 1$$

$$\Rightarrow 2^{10} - 1 = \underline{\underline{1023}}$$

4 negal

-2°

-3

