Count total set bits

[Note: 2^x can be written as: `(1<<x)`]

n = 11

For a given number n, first we need to know the Largest power of 2 that is present.

why?

Because It is easier to Calculate the number of set bit in this

when n = 11

	8	4	2	1	
0	0	0	0	0	
1	0	0	0	1	→ 2^0
2	0	0	1	0	→ 2^1
3	0	0	1	1	
4	0	1	0	0	→ 2^2
5	0	1	0	1	
6	0	1	1	0	
7	0	1	1	1	
8	1	0	0	0	→ 2^3
9	1	0	0	1	
10	1	0	1	0	
11	1	0	1	1	

→ It is easier to calculate number of set bit here as 2^3 is the Largest power of 2 for n=11

So here $x=3$, no of set bits = $x \cdot 2^{x-1}$

$= 3 \cdot 2^{3-1} = 3 \cdot 2^2 = 3 \cdot 4 = 12$

This means, there are 3 column, Each having $2^3 = 8$ row

No of Set bit = $\frac{8}{2} * \frac{8}{2} * 8/2 = 4 \cdot 4 \cdot 4 =$ $4 \times 3 = 12$

why 8/2 → becase 4 are set & 4 unset.

Next : From n to 2^3, find the No of One in MSB
i.e b/n 8 to 11

i.e $n - 2^x + 1 = 11 - 8 + 1 = 3 + 1 = 4$

Now observe

	8	4	2	1
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1
10	1	0	1	0
11	1	0	1	1

→ up until here we know no of set bits i.e $x * 2^{x-1}$

→ For this we know No of Set bits in MSB = $n - 2^x + 1$

↓

Now if we consider this

	4	2	1
0	0	0	0
1	0	0	1 → 2^0
2	0	1	0 → 2^1
3	0	1	1

→ this becomes a subproblem for n = 4

we do this as long as n=0