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* n & (n-1) concept

RMSB → 0

① Clear LSB

num , i LSB 0
0 → i

Ex → 10110100 i = 5.

Ans → 10000000

Clear LSB till i

→ num & ~[(1 << (i+1)] -1

② Clear all MSB

→ 10110100

[num & (1 << i) - 1]

---

* Character Conversions Using Bit Manipulation.

A → 65 → 01000001
B → 66 → 01000010

a → 97 → 01100001
b → 98 → 01100010

A -> 'a'
-> 5th Bit Set

a -> 'A'
5th Bit Unset.

(5) XOR Property

a	b	^
0	0	0
0	1	1
1	0	1
0	0	0

34 ^ 0 -> 34
34 ^ 34 -> 0

Associativity — Order Does Not Matter

-> 2 + 2 + 4 + 8
-> 2*4 + 2*8

Q->
Swap 2 Numbers Using Bit Manipulation

a, b

```
a = a ^ b;
b = a ^ b;
a = a ^ b;
```

Q->
-> Find a unique no in an array where every

-> [2, 4, 6, 2, 3, 3, 1, 1, 6]

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XOR → 0 ^ 4 ^ 0 ^ 0 ^ 0 ^ 0
→ 4

Q →

Find unique number in array [repeat 3 times]

[2, 2, 2, 1, 6, 6, 6]

Convert in bits →
0 0 0 0 0 0 0 0
0 0 0 0 0 0 1 0 → 2
0 0 0 0 0 0 1 0 → 2
0 0 0 0 0 0 1 0 → 2
0 0 0 0 0 0 0 1 → 1
0 0 0 0 0 1 1 0 → 6
0 0 0 0 0 1 1 0 → 6
0 0 0 0 0 1 1 0 → 6

Arr(0 0 0 0 0 3 6 1) % 3
0 0 0 0 0 0 0 1