Code Jam 2014 - Round 1B

New Lottery Game

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The Lottery is changing! The Lottery used to have a machine to generate a random winning number. But due to cheating problems, the Lottery has decided to add another machine. The new winning number will be the result of the bitwise-AND operation between the two random numbers generated by the two machines.

To find the bitwise-AND of X and Y, write them both in binary; then a bit in the result in binary has a 1 if the corresponding bits of X and Y were both 1, and a 0 otherwise. In most programming languages, the bitwise-AND of X and Y is written X&Y.

For example:
  The old machine generates the number 7 = 0111.
  The new machine generates the number 11 = 1011.
  The winning number will be (7 AND 11) = (0111 AND 1011) = 0011 = 3.

With this measure, the Lottery expects to reduce the cases of fraudulent claims, but unfortunately an employee from the Lottery company has leaked the following information: the old machine will always generate a non-negative integer less than **A** and the new one will always generate a non-negative integer less than **B**.

Catalina wants to win this lottery and to give it a try she decided to buy all non-negative integers less than **K**.

Given **A**, **B** and **K**, Catalina would like to know in how many different ways the machines can generate a pair of numbers that will make her a winner.

Could you help her?

Input

The first line of the input gives the number of test cases, **T**. **T** lines follow, each line with three numbers **A B K**.

Output

For each test case, output one line containing "Case #x: y", where x is the test case number (starting from 1) and y is the number of possible pairs that the machines can generate to make Catalina a winner.

Limits

Memory limit: 1 GB.
1 ≤ **T** ≤ 100.

Small dataset

Time limit: 60 seconds.
1 ≤ **A** ≤ 1000.

$1 \leq \mathbf{B} \leq 1000$.
$1 \leq \mathbf{K} \leq 1000$.

Large dataset

Time limit: 120 seconds.
$1 \leq \mathbf{A} \leq 10^9$.
$1 \leq \mathbf{B} \leq 10^9$.
$1 \leq \mathbf{K} \leq 10^9$.

Sample

Sample Input

```
5
3 4 2
4 5 2
7 8 5
45 56 35
103 143 88
```

Sample Output

```
Case #1: 10
Case #2: 16
Case #3: 52
Case #4: 2411
Case #5: 14377
```

In the first test case, these are the 10 possible pairs generated by the old and new machine respectively that will make her a winner: <0,0>, <0,1>, <0,2>, <0,3>, <1,0>, <1,1>, <1,2>, <1,3>, <2,0> and <2,1>. Notice that <0,1> is not the same as <1,0>. Also, although the pair <2, 2> could be generated by the machines it wouldn't make Catalina win since (2 AND 2) = 2 and she only bought the numbers 0 and 1.