Beautiful Quadruples

HackerRank

We call an quadruple of positive integers, (W, X, Y, Z), *beautiful* if the following condition is true:

$$W \oplus X \oplus Y \oplus Z \neq 0$$

Note: $\oplus$ is the bitwise XOR operator.

Given A, B, C, and D, count the number of *beautiful* quadruples of the form (W, X, Y, Z) where the following constraints hold:

- $1 \leq W \leq A$
- $1 \leq X \leq B$
- $1 \leq Y \leq C$
- $1 \leq Z \leq D$

When you count the number of *beautiful* quadruples, you should consider two quadruples as same if the following are true:

- They contain same integers.
- Number of times each integers occur in the quadruple is same.

For example $(1, 1, 1, 2)$ and $(1, 1, 2, 1)$ should be considered as same.

Input Format

A single line with four space-separated integers describing the respective values of A, B, C, and D.

Constraints

- $1 \leq A, B, C, D \leq 3000$
- For 50% of the maximum score, $1 \leq A, B, C, D \leq 50$

Output Format

Print the number of *beautiful* quadruples.

Sample Input

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1 2 3 4
```

Sample Output

```
11
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Explanation

There are 11 beautiful quadruples for this input:

1. $(1, 1, 1, 2)$
2. $(1, 1, 1, 3)$
3. $(1, 1, 1, 4)$
4. $(1, 1, 2, 3)$
5. $(1, 1, 2, 4)$
6. $(1, 1, 3, 4)$
7. $(1, 2, 2, 2)$
8. $(1, 2, 2, 3)$
9. $(1, 2, 2, 4)$
10. $(1, 2, 3, 3)$
11. $(1, 2, 3, 4)$

Thus, we print 11 as our output.

Note that $(1, 1, 1, 2)$ is same as $(1, 1, 2, 1)$.