Empty Boxes

N large empty boxes (assume they are of type:1) are initially placed on a table. An unknown number of boxes (type:1) are selected and in each of them **K** smaller boxes (type:2) are placed. Again an unknown number of type:2 boxes are selected and **K** boxes of type:3 are placed inside. This process is repeated **T** times. Now a box is assumed to be empty when it has no smaller boxes inside it. Finally after all the processes are complete let there be **F** empty boxes in total.

LIMITS

1< N, K, T, F <1000000

Input

First line of the input file contains the number of test cases. Then each line contains 4 integers N, K, T, F as described above.

Output

Each line should contain the total number of boxes on the table.

Example

Input:
1
11 8 2 102

Output:
115