Task: WYR
Wyrażenie arytmetyczne (Arithmetic expression)

XXXIII OI, Stage I (school round). Source file `wyr.*` Available memory: 128 MB. *21.11.2025*

Note: In this task, you will learn the score of your submission ***only after the competition has ended.***

Bajtek likes to spend his free time solving arithmetic puzzles. Most of them sound quite similar: for given parameters a, b, c and a number n we want to construct an arithmetic expression with the smallest cost that evaluates to n.

Arithmetic expressions are defined recursively as follows. `1` is an arithmetic expression with cost a that evaluates to 1. Then, if X and Y are arithmetic expressions with costs (respectively) x and y that evaluate to (respectively) p and q, then:

1. $(X + Y)$ is an arithmetic expression with cost $x + y + b$ that evaluates to the sum of p and q,
2. $(X \times Y)$ is an arithmetic expression with cost $x + y + c$ that evaluates to the product of p and q.

For example, $((\texttt{1} + \texttt{1}) \times (\texttt{1} + \texttt{1})) \times (\texttt{1} + \texttt{1})$ is a valid arithmetic expression with cost $6a + 3b + 2c$ that evaluates to 8.

Bajtek would like to know the minimal costs of arithmetic expressions that evaluate to the successive integers from 1 to n. He quickly realized that computing these costs is rather tedious and asked you, a programmer friend, for help. Help him determine the minimal expression costs!

Input

The first and only line of input contains four integers n, a, b, c ($1 \le n \le 3\,000$, $1 \le a, b, c \le 10^9$).

Output

The first and only line of output should contain n integers separated by single spaces, where the i-th of these numbers denotes the minimal cost of an arithmetic expression that evaluates to i.

Example

For the input:

```
6 1 4 2
```

the correct output is:

```
1 6 11 14 19 19
```

Explanation: The following table shows expressions with the minimal costs that evaluate to the successive integers.

Integer	Expression	Costs
1	`1`	$a = 1$
2	`(1+1)`	$2a + b = 2 + 4 = 6$
3	`((1+1)+1)`	$3a + 2b = 3 + 8 = 11$
4	`((1+1)*(1+1))`	$4a + 2b + c = 4 + 8 + 2 = 14$
5	`(((1+1)*(1+1))+1)`	$5a + 3b + c = 5 + 12 + 2 = 19$
6	`(((1+1)+1)*(1+1))`	$5a + 3b + c = 5 + 12 + 2 = 19$

Sample tests: Test `0a` is the test from the example above. Further:

`0b`: $n = 9, a = 2, b = 3, c = 1$.

`0c`: $n = 200, a = 1, b = 2, c = 3$.

`0d`: $n = 2500, a = 1, b = 1, c = 1$.

`0e`: $n = 3000, a = b = c = 10^9$.

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Grading

The test cases are divided into the following subtasks. The tests for each subtask consist of one or more separate groups of test cases.

Subtask	**Constraints**	**Points**
1	$n \leq 10$	13
2	$n \leq 200$	31
3	$a = b = c = 1$	13
4	no additional constraints	43