

# INTERNATIONAL TOURNAMENT IN INFORMATICS

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Senior Group

## Task A2. GAME

John and George play the following game: John chooses one integer  $x$  in the set  $A_n = \{1, 2, 3, \dots, n\}$ . George has to guess the value of  $x$ . Players play by consecutive moves  $= 1, 2, \dots$ . In the  $k$ -th move of the game, George chooses a subset  $B_k$  of  $A_n$  and John says YES, if  $x$  belongs to  $B_k$  or NO, otherwise. In case of answer NO, George pays John  $a$  euros; in case of answer YES, George pays John  $b$  euros. We want to know the minimum amount of euros that George has to pay in order to find  $x$ , regardless of John's choice.

Write a program **game** that calculates the wanted minimum amount.

### Input:

On the first line of the standard input are given three integers  $n$ ,  $a$ , and  $b$ , separated by a space.

### Output:

On the standard output, print out one integer, that is equal to the wanted minimum amount of euros.

### Constraints:

$$1 < n < 10^{18}$$

$$0 < a, b < 1\,000$$

### Grading:

Subtask 1 (26 points):  $1 < n < 10\,000$ ,  $0 < a < 1\,000$ ,  $0 < b < 1\,000$ ;

Subtask 2 (38 points):  $10\,000 \leq n < 10\,000\,000$ ,  $0 < a < 1\,000$ ,  $0 < b < 1\,000$ ;

Subtask 3 (36 points):  $10\,000\,000 \leq n < 10^{18}$ ,  $a = 1$ ,  $0 < b < 1\,000$ .

*Your program will get points for a given subtask only if all test cases for that subtask are passed successfully.*

### Example:

| Input | Output |
|-------|--------|
| 5 1 2 | 4      |

### Explanation:

George can find  $x$  for 4 euros, in the following way:

George selects set  $B_1 = \{1, 2\}$ .

- If John's answer is YES, George pays 2 euros and then selects set  $B_2 = \{1\}$ . If the next answer is YES, George pays another 2 euros and the game ends (the chosen integer was 1), otherwise he pays another 1 euro and the game ends (the chosen integer was 2).
- If John's answer is NO, George pays 1 euro and selects the set  $B_2 = \{3\}$ . If the next answer is YES, George pays another 2 euros and the game ends (the chosen integer was 3), otherwise he pays another 1 euro and selects the set  $B_3 = \{4\}$ . If the last answer is YES, George pays another 2 euros and the game ends (the chosen integer was 4), otherwise George pays another 1 euro and the game ends (the chosen integer was 5).