

# WOBURN CHALLENGE

**2017-18 Online Round 2**

Friday, February 23<sup>rd</sup>, 2018

*Junior Division Problems*

Automated grading is available for these problems at:

**[wcipeg.com](http://wcipeg.com)**

For more problems from past contests, visit:

**[woburnchallenge.com](http://woburnchallenge.com)**

## Problem J1: The Rings of Power

20 Points / Time Limit: 2.00s / Memory Limit: 16M

Submit online: <http://wcipeg.com/problem/wc172j1>

*E* Rings for the Elven-kings under the sky,  
*D* for the Dwarf-lords in their halls of stone,  
*M* for Mortal Men doomed to die,  
One for the Dark Lord on his dark throne,  
In the Land of Mordor where the Shadows lie,  
One ring to rule them all, one ring to find them,  
One ring to bring them all and in the darkness bind them,  
In the Land of Mordor where the Shadows lie.



As the above passage indicates, a number of Rings of Power exist in Middle-earth, with exactly one of them owned by the Dark Lord Sauron, and the others distributed amongst Elves, Dwarves, and Men according to the values  $E$ ,  $D$ , and  $M$  ( $2 \leq E, D, M \leq 9$ ). Your task is to determine the total number of Rings of Power which have been forged (that is, the number of rings held by Elves, Dwarves, Men, and Sauron combined).

### Input Format

The first and only line of input consists of three space-separated integers,  $E$ ,  $D$ , and  $M$ .

### Output Format

Output a single integer, the total number of Rings of Power.

### Sample Input

3 7 9

### Sample Output

20

### Sample Explanation

Elves have 3 Rings, Dwarves have 7, Men have 9, and Sauron himself has 1, for a total of 20.

## Problem J2: Breeding an Army

24 Points / Time Limit: 2.00s / Memory Limit: 16M

Submit online: <http://wcipeg.com/problem/wc172j2>

The evil wizard Saruman is breeding himself an army of fearsome Uruk-hai soldiers. Each Uruk-hai can be created out of  $M_u$  men,  $O_u$  orcs, and  $L_u$  litres of mud ( $1 \leq M_u, O_u, L_u \leq 1000$ ).

Saruman has at his disposal  $M_s$  men,  $O_s$  orcs, and  $L_s$  litres of mud ( $1 \leq M_s, O_s, L_s \leq 1000$ ).

What's the maximum number of Uruk-hai that Saruman can create without exceeding his resources?



### Input Format

The first line of input consists of three space-separated integers,  $M_u$ ,  $O_u$ , and  $L_u$ .  
The next line consists of three space-separated integers,  $M_s$ ,  $O_s$ , and  $L_s$ .

### Output Format

Output a single integer, the maximum number of Uruk-hai that can be created.

### Sample Input

```
1 4 3
8 14 10
```

### Sample Output

```
3
```

### Sample Explanation

Creating 3 Uruk-hai requires 3 men, 12 orcs, and 9 litres of mud, which doesn't exceed Saruman's resources. However, he would not be able to create 4 Uruk-hai.

## Problem J3: Escaping the Mines

24 Points / Time Limit: 2.00s / Memory Limit: 16M

Submit online: <http://wcipeg.com/problem/wc172j3>

Pursued by a swarm of goblins, the  $N$  ( $1 \leq N \leq 9$ ) members of the Fellowship of the Ring are trying to escape from the Mines of Moria. To do so, they must cross a chasm which is  $M$  ( $1 \leq M \leq 10$ ) metres wide. The  $i$ -th member of the Fellowship can jump a distance of up to  $J_i$  ( $1 \leq J_i \leq 10$ ) metres. Therefore, they can only cross the chasm by themselves if they can jump a distance of at least  $M$  metres.

Fortunately, if someone is able to jump over the chasm themselves, they can also carry at most one other person along with them. This does not affect their jumping distance. Unfortunately, there isn't enough time for them to then jump back and carry yet another person across.



Assuming that the Fellowship works together, what's the maximum number of its members who can end up getting across the chasm and escaping the Mines of Moria?

### Input Format

The first line of input consists of two space-separated integer,  $N$  and  $M$ .  
The next line consists of  $N$  space-separated integers,  $J_{1..N}$ .

### Output Format

Output a single integer, the maximum number of Fellowship members who can escape.

### Sample Input

```
5 6
3 6 4 1 10
```

### Sample Output

```
4
```

### Sample Explanation

One optimal strategy is for the 2nd member to jump across while carrying the 3rd member, and for the 5th member to jump across while carrying the 4th member. Unfortunately, this leaves the 1st member unable to cross by themselves, but there's no way for the entire Fellowship to escape.

## Problem J4: Entish Translation

32 Points / Time Limit: 2.00s / Memory Limit: 16M

Submit online: <http://wcipeg.com/problem/wc172j4>

The Ents of Fangorn Forest have all convened in order to vote on an important decision - should they go to war against the treachery of Saruman, or continue to mind their own business? Merry and Pippin have managed to convince Treebeard, the oldest of the Ents, of the need to take action. As such, Treebeard has prepared a speech designed to convince the other Ents of the same. Unfortunately, he has written it in Old Entish, which is a decidedly unhasty language. The Hobbits suspect that it may take him weeks just to get through it! As such, they'd like to translate it into New Entish, a more compact version of the Ents' language.



The two Hobbits will translate one word at a time. They're taking a look at the first word in the Old Entish speech, which is a non-empty string with at most 100 characters. Each character is either a lowercase letter ("a".."z"), or a dash ("-"). Neither the first nor the last character is a dash, and there are never multiple consecutive dashes. The dashes divide the word up into one or more "tokens". In other words, each token is a maximal contiguous sequence of letters.

Translating a word from Old Entish into New Entish is a two-step process:

1. In each token, for each contiguous sequence of consonants (letters aside from "a", "e", "i", "o", and "u"), reduce it down to just the first letter in that sequence.
2. For each contiguous sequence of equal tokens, reduce it down to just a single copy of that token.

Please determine the result of translating the first word of Treebeard's speech into New Entish by applying the above process to it.

### Input Format

The first and only line of input consists of a single string, the word in Old Entish.

### Output Format

Output a single string, the word translated into New Entish.

### Sample Input

```
a-lalla-lalla-rumba-kamanda-lindor-burume-burumne-byurstume-a-keema
```

### Sample Output

```
a-lala-ruma-kamana-linor-burume-a-keema
```

### Sample Explanation

For example, during the translation process, each of the 7th, 8th, and 9th tokens initially gets reduced to "burume". Then, only the first of these three equal consecutive tokens is retained.