WOBURN CHALLENGE

2018-19 Online Round 3

Friday, February 1st, 2019

Junior Division Problems

Automated grading is available for these problems at:
wcipeg.com

For more problems from past contests, visit:
woburnchallenge.com

Problem J1: An Honest Day’s Work

14 Points / Time Limit: 2.00s / Memory Limit: 16M *Submit online: http://wcipeg.com/problem/wc183j1*

Jessie, James, and Meowth, members of the honourable Team Rocket, have unfortunately fallen on hard times. With their funds necessarily allocated to constructing all manner of giant robots and other devices, they've been having difficulty affording any food lately. But that's nothing that an honest day's work can't fix!

James has a can of leftover paint, containing P ($1 \le P \le 100$) litres of the stuff. When combined with his boundless collection of bottlecaps, this can result in some high-quality wares. When a bottlecap is artfully covered with B ($1 \le B \le 100$) litres of paint, it turns into a completely legitimate, Pokémon league-certified gym badge!

James will produce as many badges as he can using the paint, using exactly B litres each. Pokémon trainers love their gym badges, so each such badge is sure to sell for D ($1 \le D \le 100$) Pokédollars.

There might still be some extra paint left over, once there's not enough for another complete badge. However, there's no need for it to go to waste — James will sell any remaining paint at a rate of 1 Pokédollar per litre.

How much money will James make for Team Rocket in total, from his sales of badges and leftover paint? Hopefully it'll be enough for at least a loaf of bread!

Input Format

The first line of input consists of a single integer, P.
The second line consists of a single integer, B.
The third line consists of a single integer, D.

Output Format

Output a single integer, the amount of money which James will make (in Pokédollars).

Sample Input

```
14 3 10
```

Sample Output

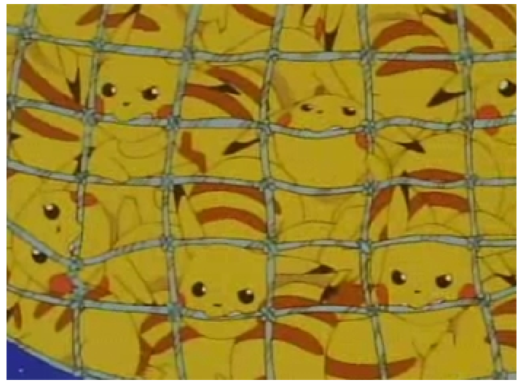
```
42
```

Sample Explanation

James has enough paint for 4 badges, which he'll then sell for 40 Pokédollars. That will leave him with 2 unused litres of paint, which he'll sell for an additional 2 Pokédollars.

Problem J2: Net Weight

22 Points / Time Limit: 2.00s / Memory Limit: 16M *Submit online: http://wcipeg.com/problem/wc183j2*



Oh boy, is it ever Team Rocket's lucky day: They've stumbled upon a gathering of N ($1 \le N \le 100$) wild, defenseless Pikachus! This is their chance to snatch up as many of these priceless Pokémon as they can!

Jessie and James each have a net, which can allow them to catch at most one Pikachu each. There's just one possible caveat: Each net can only hold a Pikachu which weighs at most 100 pounds. The i-th of the N Pikachus has a weight of W_i ($1 \le W_i \le 200$) pounds.

Heavier Pikachus are sure to be more valuable, so Team Rocket would like to catch the heaviest ones they can. Given that Jessie and James each choose at most one Pikachu to catch (and don't both catch the same Pikachu), such that each of their chosen Pikachus weighs at most 100 pounds, what's the maximum possible sum of Pikachu weights which they can get their hands on?

Input Format

The first line of input consists of a single integer, N.
N lines follow, the i-th of which consists of a single integer, W_i, for $i = 1..N$.

Output Format

Output a single integer, the maximum combined weight of Pikachus which Team Rocket can catch (in pounds).

Sample Input 1

```
5
43
100
31
104
62
```

Sample Output 1

```
162
```

Sample Input 2

```
3
101
1
200
```

Sample Output 2

```
1
```

Sample Explanation

In the first case, Jessie can catch the 2nd Pikachu while James catches the 5th Pikachu, for a combined weight of 100 + 62 = 162 pounds.

In the second case, Jessie can catch the 2nd Pikachu while James catches none.

Problem J3: R

28 Points / Time Limit: 2.00s / Memory Limit: 16M *Submit online: http://wcipeg.com/problem/wc183j3*

Jessie, James, and Meowth, members of the honourable Team Rocket, are big fans of the letter `R`. It's just such an awe-inspiring letter! It only makes sense that it should feature prominently on all of their uniforms and equipment.

James is generally tasked with painting the letter `R` onto Team Rocket's various belongings. Sometimes he needs to paint small `R`'s, and other times enormous ones. As such, he'd like to get in some extra practice with painting the most beautifully perfect `R`'s that he can.

Today, James would like to paint an `R` of size S ($3 \le S \le 30$) onto a grid with $2S - 1$ rows and S columns. The required state of each cell in the grid may be represented with a character, either "`#`" if that cell should be painted, or "`.`" if it should be left unpainted.

The top portion of an `R` of size S consists of the painted outline of a square of cells with side-length S, with its top-right and bottom-right corners left unpainted. Below that, a vertical line of $S - 1$ cells should be painted, running up from the grid's bottom-left corner to just below the square. Finally, to the right of that, a diagonal line of $S - 1$ cells should be painted, running up-left from the grid's bottom-right corner to just below the square. Please see the sample cases for a demonstration.

Help James visualize what a perfect `R` of size S should look like!

Input Format

The first and only line of input consists of a single integer, S.

Output Format

Output a grid with $2S - 1$ rows and S columns of characters, representing an `R` of size S.

Sample Input 1

```
5
```

Sample Output 1

```
####.
#...#
#...#
#...#
####.
##...
#.#..
#..#.
#...#
```

Sample Input 2

```
3
```

Sample Output 2

```
##.
#.#
##.
##.
#.#
```

Problem J4: Leveling Up

36 Points / Time Limit: 2.00s / Memory Limit: 64M *Submit online: http://wcipeg.com/problem/wc183j4*

Jessie loves her Arbok, but the poor snake seems to not have much luck winning any battles. Jessie's decided to turn things around by helping Arbok level up! There's no better way to train than going around and defeating wild Pokémon who are just minding their own business, so that's exactly what Jessie intends on doing.

Jessie and her Arbok, as well as N ($1 \le N \le 1000$) wild Pokémon, are all standing at various points along a trail, which can be represented as a number line. Jessie's initial position along the trail is S ($1 \le S \le 100{,}000$), while the i-th wild Pokémon's position is P_i ($1 \le P_i \le 100{,}000$). All $N + 1$ of these positions are distinct.

Jessie can walk in either the positive or negative direction along the trail. However, whenever she arrives at the same location as a wild Pokémon, sneaking by is out of the question — she must have Arbok battle it.

Arbok's initial level is L ($1 \le L \le 100{,}000$), while the i-th wild Pokémon's level is M_i ($1 \le M_i \le 100{,}000$). Arbok can defeat a Pokémon if Arbok's current level is greater than or equal to that Pokémon's level. If Arbok defeats the i-th wild Pokémon, Arbok's current level will increase by G_i ($1 \le G_i \le 100{,}000$), and that Pokémon will faint and no longer occupy a point on the trail. Jessie will never make Arbok battle against a Pokémon whose level is strictly greater than Arbok's level, as Arbok would faint instead and would not be able to gain any more levels.

What's the maximum possible level which Jessie can help Arbok achieve, by optimally choosing how to walk around on the trail?

Input Format

The first line of input consists of a single integer, N.
The next line consists of two space-separated integers, S and L.
N lines follow, the i-th of which consists of three space-separated integers, P_i, M_i, and G_i, for $i = 1..N$.

Output Format

Output a single integer, the maximum possible level which Arbok can achieve.

Sample Input

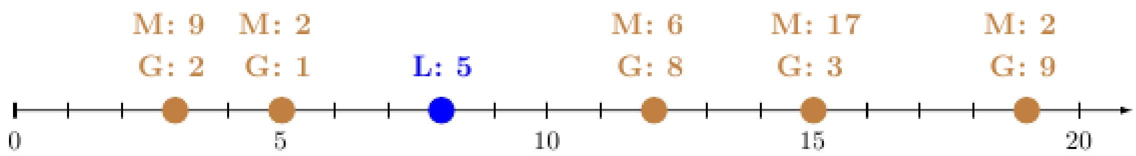
```
5
8 5
3 9 2
19 2 9
12 6 8
5 2 1
15 17 3
```

Sample Output

```
16
```

Sample Explanation

The following diagram illustrates Jessie's starting location (indicated in blue) as well as the wild Pokémon (indicated in brown):



Jessie can move left to position 5, and defeat the Pokémon there to increase Arbok's level to 6. She can then move right to position 12, defeating the Pokémon there and raising Arbok's level to 14. Finally, she can defeat the Pokémon at position 3 to increase Arbok's level to 16. This is the highest level which Arbok would ever be able to reach.