Task 5

The Lightest Mobile

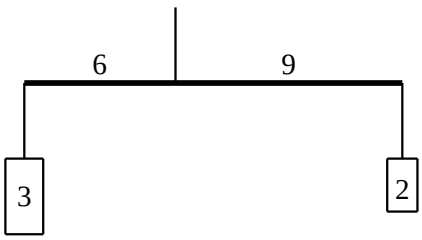
Task

A mobile is a popular decoration that has moving objects. The Japanese Committee for the IOI will make a mobile to promote the Japanese Olympiad in Informatics (JOI). The mobile for promotion of JOI is composed of bars, wires and weights, and made up as follows:

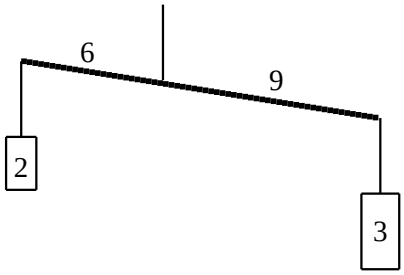
- One of the ends of a bar is colored blue, and the other end is colored red.
- A bar hangs from a wire at a fulcrum that is not end points.
- The lengths from the fulcrum to the blue end and to the red end are both positive integers.
- Either a weight or a bar is suspended from an end of a bar by a wire.
- No objects are suspended from a weight.
- The weight has a positive integer weight.
- There is a wire such that one of its end is attached to the fulcrum of a bar and the other end is not adapted to any objects. The other wires satisfy either
  - the wire connects an end of a bar to the fulcrum of a bar or,
  - the wire connects an end of a bar to a weight.

Furthermore, every bar has to be balanced. Wires and bars are so light that we can assume that the weights of them are equal to 0. A bar is balanced, if and only if

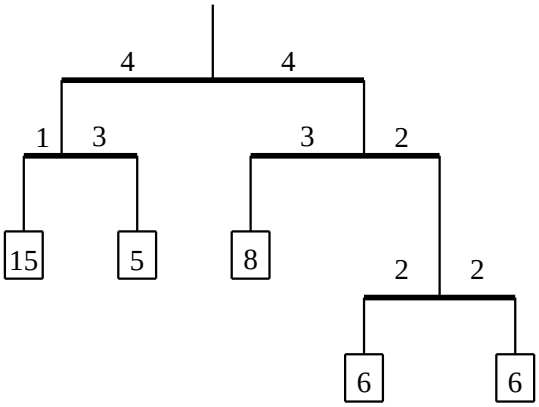
$$\begin{aligned} & (\text{the total amount of weights that are suspended under its blue end}) \\ & \times (\text{the length from its fulcrum to its blue end}) \\ = \; & (\text{the total amount of weights that are suspended under its red end}) \\ & \times (\text{the length from its fulcrum to its red end}). \end{aligned}$$



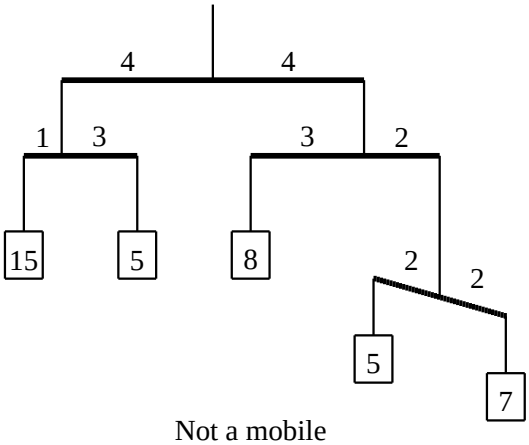
A simple mobile



Not a mobile,
since it isn’t balanced.



A mobile

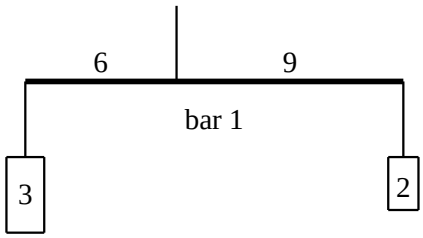


Not a mobile

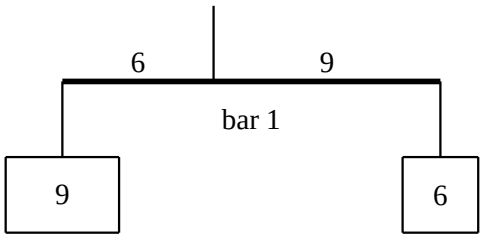
It has been decided what lengths of bars are used and how the wires connect an end of a bar to a bar or a weight and has not yet decided what weights are used.

In order to handle easily, we want to make a mobile as light as possible. Write a program that finds the lightest mobile and reports the total amount of the weights. As has been mentioned, it is necessary that every bar of a mobile is balanced. A program is given the description of the mobile as input, and it contains the followings.

- an integer n, the number of bars.
- the description of each bar (the bars are labeled the distinct integers from 1 to n).
  - the proportion of the length from the fulcrum to the red end to the length to the blue end.
  - the label of the bar that is suspended from the red end (the label is equal to 0 when a weight is suspended).
  - the label of the bar that is suspended from the blue end (the label is equal to 0 when a weight is suspended).



the lightest mobile



not the lightest mobile

Input

The input file is named `input.txt`.

The first line contains n, the number of bars that are used in mobile. The following n ($1 \leq n \leq 100$) lines contain data of bars, one per line. The $(i + 1)$-th line ($1 \leq i \leq n$) contains 4 space-separated integers p, q, r, b. The line represents that for the bar labeled i the proportion of the length from the

fulcrum to the red end to the length to the blue end is $p : q$, the bar labeled r is suspended from the red end and the bar labeled b is suspended from the blue end. Where a weight is regarded as the bar labeled 0. For all inputs, we can assume $wL < 2^{31}$, where w is the weight of the lightest mobile and L is the greatest integer among integers that appear in the input data to represent the proportions of the lengths.

Output

The output file is named `output.txt`.

The output file should contain a single integer, which is the lightest weight of the mobile.

Sample input and output

`input.txt`

```
4
3 2 0 4
1 3 0 0
4 4 2 1
2 2 0 0
```

`output.txt`

```
40
```