Problem I: Teaching Competitive Programming

After being inspired by SI@UCF Competitive Programming camp, you've decided that you want to bring back Competitive Programming to your local community. You have a plan, when you get back, in one year, you'll teach **n** new people about Competitive Programming. Then, in year two, those **n** students will **each** go teach **n**-1 new students. (See, the kids you taught aren't quite as charismatic or popular as you, but they are close.) Then, in year three, the students who learned the year before will go teach **n**-2 new students, and so forth. Eventually, a maximum will be reached of course, because the students who are taught by teachers who only teach one student won't go on to teach anyone else.

Let's take a look at an example. Let's say you decide to teach 7 students when you get back into town. Then, at the end of one year, 1 + 7 = 8 students will know about competitive programming. (**You are part of the count, of course. **You are the master!) Then, in year two, each of the 7 students you taught will teach 6 new students, so 42 new students will learn competitive programming in year two and at the end of two years, a total of 1 + 7 + 42 = 50 students will have learned competitive programming. At the end of year three, a total of 1 + 7 + 42 + 42 x 5 = 260 students will have learned competitive programming. (Notice that after one year of teaching new students, each person no longer continues teaching.)

You have a target number of students you'd like to reach and you can't wait forever, so you'd like at least **t** students in your community, including you, to know about competitive programming by the end of year **y**, after you taught the initial batch of students.

Problem
Given that you would like at least **t** students in your community to know about competitive programming by the end of year **y**, after you taught the initial batch of students, determine the minimum number of students you have to teach in the first year to achieve your goal.

Input
The first line of input will contain a single integer, **c**, representing the number of input cases. Each input case follows, one per line. Each input case will contain two space separated integers: **t** and **y**, representing the target number of students you would like to know about Competitive Programming, and the time limit within which you'd like to reach that target, respectively.

Output
For each input case, on a line by itself, output the minimum number of students you have to teach in the first year to reach your goal.

Input Bounds and Corresponding Credit

30 Points	70 Points
• $1 \le c \le 100$ • $1 \le t \le 10,000$ • $1 \le y \le 10$	• $1 \le c \le 1000$ • $1 \le t \le 10^{18}$ • $1 \le y \le 10^{18}$

Samples

Input	Output
2 250 3 150 1	7 149