Yesterday in Seven Queries

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	1024 megabytes

This is an interactive problem.

Dear friends, welcome to Shenyang! As the problem setters, together with the entire staff, we are deeply honored to be here with all of you, to enjoy this carefully prepared event, and to witness Northeastern University host the ICPC Shenyang Regional Contest for the twelfth consecutive year.



The Lovely Northeastern University

Northeastern University (NEU) was founded on April 26, 1923. In its history of over 90 years, the university has formed its unique spirit: "Striving constantly for improvement and behaving in conformity with truth". It has gained a number of high-level scientific research achievements, such as the first analog computer, the first domestically produced CT, the first piece of super steel, the new technology of smelting vanadium titanium magnetite, the energy-saving theory and technology of steel industry, the controlled rolling and controlled cooling technique, and the mixed intelligent optimization control technology. By establishing the first university science park in China, it has established a series of high-tech enterprises, such as the Neusoft Corporation and the Neunn Technology Inc., and formed its unique characteristics in the areas of technological innovation, technological transfer and industry-university cooperation.

The university is situated in Shenyang, the central city of the Northeastern China, and it also has a campus in Qinhuangdao City, Hebei Province. The university occupies a total area of 2,550,000 square meters, of which the architectural area amounts to 1,680,000 square meters. It has 4,538 faculty members, among whom 2,711 are full-time teachers. The university has 5 academicians of the Chinese Academy of Engineering, 4 foreign academicians, 18 scholars who are selected into "National High-level Personnel of Special Support Program", 23 winners of "The National Science Fund for Distinguished Young Scholars", 16 winners of the "Joint Research Fund for Overseas Chinese Scholars and Scholars in Hong Kong and Macao", 102 who are selected into the "New Century Excellent Talents Support Project", and 14 who are selected into "the National Outstanding Talents Project". The university has 4 innovation groups of the National Natural Science Foundation and 3 innovation teams of the Ministry of Education. It has more than 100 research institutes including 3 national key laboratories, 4 national engineering (technology)

research centers and 3 national engineering laboratories. Besides, it has 2 national collaborative innovation centers and 3 collaborative innovation centers of Liaoning province.

You may view the website About NEU-Northeastern University for more related information.

Little Q travels back in time to a year between 1923 and 2025 to visit NEU in history. He tries to find out which year he has reached by asking at most 7 queries to passers-by.

Each query consists of an integer x. The interactor will output an integer t ($t \in \{0, 1\}$) as the answer.

- If $t = 0$, the year he has reached is less than x;
- Otherwise, the year he has reached is at least x.

Note that the interactor is possibly adaptive, i.e., the year for each test case need not be fixed in advance. It may choose its responses based on your queries, but all responses must remain consistent with at least one year in the allowed range. Your program must be correct for every interactor behavior satisfying these rules.

Input

The first line of the input contains an integer T ($1 \leq T \leq 100$), the number of test cases. There is no additional input for each test case.

Interaction Protocol

If you want to ask a query, output one line. First output `?` followed by a space, then output an integer x ($1923 \leq x \leq 2025$). After flushing your output, your program should read an integer t, the answer to the query. If the query is invalid, or you have already asked 7 queries in the current test case, the interactor will output -1 and terminate.

If you want to guess the year, output one line. First output `!` followed by a space, then output an integer y ($1923 \leq y \leq 2025$), the year. After flushing your output, your program should read an integer r. If $r = 1$, the guess is correct, and your program should continue with the next test case, or exit immediately if there are no more test cases. If $r = -1$, the guess is wrong, the interactor terminates, and you will get a `Wrong Answer` verdict. Note that your guess does not count as a query.

Upon receiving -1 at any point, your program should terminate immediately to avoid any unexpected verdicts.

To flush your output, you can use:

- `fflush(stdout)` (if you use `printf`) or `cout.flush()` (if you use `cout`) in C and C++.
- `System.out.flush()` in Java and Kotlin.
- `sys.stdout.flush()` in Python.

Example

standard input	standard output
1 0 1 1	? 2025 ? 1923 ! 1923

Note

Blank lines in the sample are added for readability. Extra spaces or blank lines in your output will be ignored.