ping

Time Limit: 1 second
Memory Limit: 64 MB

Problem Description

Ryan is playing a game with AJ the Hamster on the number line with markings at integer points 1 metre apart. AJ will stand at some integer S while Ryan walks around blindfolded and carrying a special rabbit plush.

While standing at some integer (possibly the same one as AJ), Ryan can try to ping AJ's location using the rabbit plush, which will give Ryan the distance between himself and AJ.

AJ doesn't like getting constantly pinged, thus Ryan must try to determine AJ's location with as few pings as possible.

Interaction Protocol

This is a function call problem. You are to implement the following function:

- `int rabbit(int P)`
  - P is the maximum number of calls you can make to `ping`
  - This function should return a single integer, S, the position of AJ.

You should make use of the following grader functions:

- `int ping(int x)`
  - x is the current position of Ryan
  - This function will return the distance between Ryan (at x) and AJ (at S).
  - You cannot call this function more than P times per testcase.

If any of the above conditions are not satisfied, your program is judged as Wrong Answer. Otherwise, your program is judged as Accepted and your score is calculated by the number of calls to press (see Subtasks).

Scoring

Subtask	Score	P	Additional Constraints
1	10	$P = 100000$	$S = 1$
2	30	$P = 100000$	$1 \leq S \leq 100000$
3	60	$P = 30$	
For all subtasks: $1 \leq S \leq 10^9, 1 \leq P \leq 100000$			

Subtasks 3 is a partial scoring subtask. Let X be the number of calls to `ping`. Your score will be $60 \times min(1, \frac{31-X}{30})$ for each testcase

Sample Grader

The sample grader reads the input in the following format:

- line 1: S P

If your program is judged as Accepted, the sample grader prints `Accepted: Q` with Q being the number of calls to the function `ping`.

If your program is judged as Wrong Answer, it prints `Wrong Answer: MSG`. The meaning of `MSG` is as follows:

- `invalid pings`: A value of x `ping` is invalid. Namely, x is not an integer in the range $[1, 10^9]$.
- `too many pings`: The function `ping` is called more than P times.
- `wrong position`: The return value of `rabbit` is not the same as S.

Example

Suppose AJ is currently at $S = 5$ and $P = 100000$. The grader will call `rabbit(100000)`. An example of communication is shown below.

Call	Return
`ping(2)`	3
`ping(7)`	2
`ping(3)`	2
`ping(5)`	0

The program decides that the correct response is $S = 5$ and returns 5. The file `sample-01-in.txt` corresponds to this testcase.