

### **Q12. Balloon Shooting Game (20 marks):**

With reference to Figure Q12, in a balloon shooting game, there are  $n$  balloons placed along a straight line with the same or different heights. An archer, standing on an open-air elevator, is shooting arrows from the left to the right.

Without considering the gravity, air resistance, and size of the balloon, an arrow will fly horizontally in free space after being shot until it hits a balloon at the same height. When this happens, the balloon will burst; if the height is greater than  $x$  metres at the moment, then the trajectory of the arrow drops vertically  $x$  metres and then it continues to fly horizontally in the same direction; however, if the height is less than or equal to  $x$  metres at the moment when the arrow hits the balloon, then the arrow will drop to the ground.

The archer can control the elevator in order to determine the height that he/she shoots an arrow.

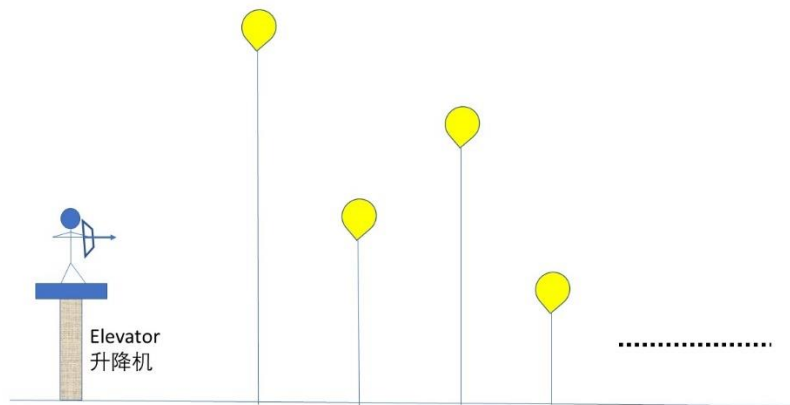


Figure Q12: Balloon shooting game

### **Write a programme to**

#### **Input, in sequence,**

the number of balloons,  $n$ , where  $1 \leq n \leq 20$ ;

$x$ , the decrease of height when an arrow hits a balloon;

$n$  positive values, which represent the heights of the  $n$  balloons from the left to the right.

**Output,** the minimum number of arrows that the archer needs to shoot in order to burst all  $n$  balloons.

### 试题 12. 气球射击游戏 (20 分) :

请参考图 Q12。在一个气球射击游戏中，有  $n$  个气球或高或低地被摆放在一条直线上。有一位弓箭手，站在一个开放式的升降机上，准备由左边射箭至右边。

不考虑地心引力、空气阻力、以及气球的尺寸，当箭射出后，它将会在空中持续水平飞行，直到击中一个气球。当这发生时，被击中的气球将会爆破。若此时箭的高度大于  $x$  公尺，则箭的飞行路线会被垂直降低  $x$  公尺，然后继续朝原来的方向水平飞行；但若击中气球时箭的高度小于或等于  $x$  公尺，则箭会落到地面停止飞行。

弓箭手可以调控升降机的高度，以决定他要在哪个高度把箭射出。

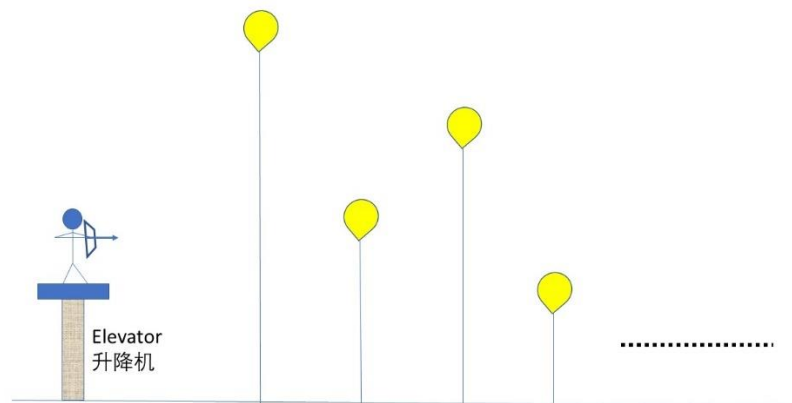


图 Q12: 气球射击游戏

试写一程式以

依序输入，

气球的数目， $n$ ，其中  $1 \leq n \leq 20$ ;

$x$ , 当箭射中气球时，箭会降低的高度;

$n$  个正数，这些数字代表了由左到右相应的气球的高度。

输出， 弓箭手至少要射出箭的数目以爆破所有  $n$  个气球。

**Example (例子)**

Input (输入)	Output (输出)
5 1 5 4 3 2 1	1
5 2 5 4 3 2 1	2
10 1 8 9 10 11 12 11 7 8 7 7	6
12 1.5 5.5 4.5 2.5 7 6 5.5 4 3 4.5 3 2.5 1.5	5

All Test Cases (所有测试用的例子):

Input (输入)	Output (输出)
5 1 5 4 3 2 1	1
5 2 5 4 3 2 1	2
10 1 8 9 10 11 12 11 7 8 7 7	6
12 1.5 5.5 4.5 2.5 7 6 5.5 4 3 4.5 3 2.5 1.5	5
20 3 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1	3
10 2.5 10 20 7.5 12 17.5 5 9.5 2.5 15 12.5	3
6 2 4 20 16 12 8 4	6
5 0.5 5 4 3 2 1	5