Homework #1 (*not used for evaluation*)

The Problem

Peter has a couple of crystal balls and he would like to test how hard they are. He finds a stair (Figure 1) with $n$ steps: 1, 2, ..., $n$. He wants to find the smallest step $i$ such that his ball will break if it is dropped from the top of the stair. (In other words, the ball will not break for all steps $j < i$ and it will break for all steps $j \geq i$.)

1. If Peter can only use exactly one ball, how can he design a fast algorithm to find $i$?

2. If Peter can only use exactly two balls, how can he design a fast algorithm to find $i$?

In both cases, once a ball is broken Peter can't use a replacement.