





The island highlighted in Image C already has three adjacent islands with water. Therefore, the fourth adjacent island must have no water and we place an  $n$  in it. The island highlighted in Image D already has one adjacent island with no water. Since the number on the island is 3 and there are only three more adjacent islands, each of these must have water and we place a  $w$  on each.

Image C

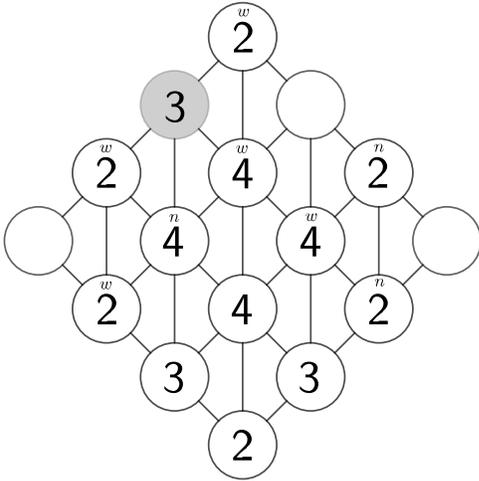
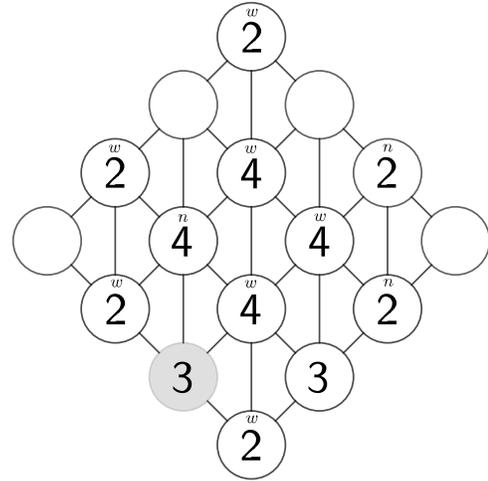


Image D



In Image E, the highlighted island already has four adjacent islands with water. Therefore, the remaining two adjacent islands have no water and we place an  $n$  on each. In Image F, the highlighted island needs two adjacent islands with water, currently there is only one. Therefore, the remaining adjacent island must have water and we place a  $w$  on it.

Image E

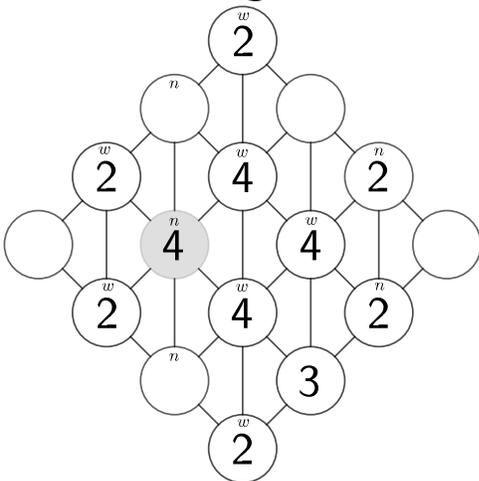
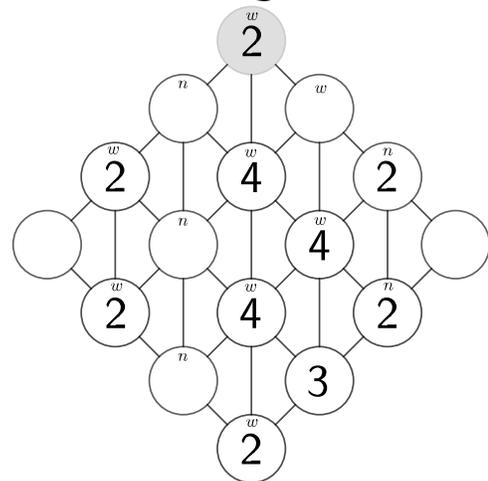
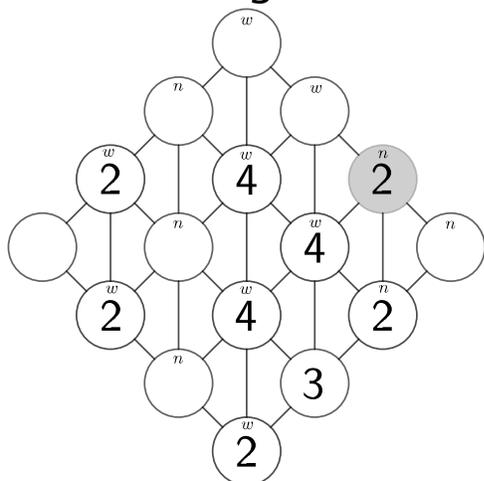


Image F

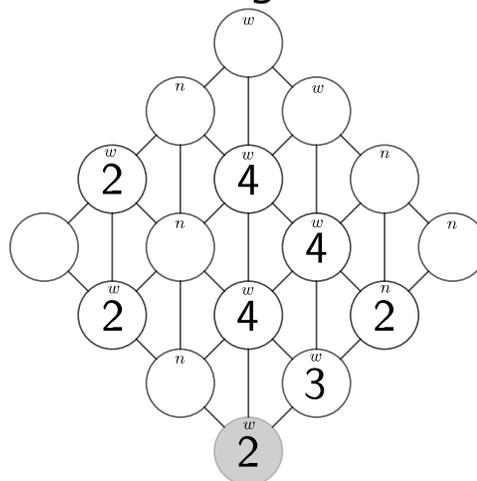


The island highlighted in Image G already has two adjacent islands with water. Therefore, the remaining adjacent island has no water and we place an  $n$  on it. In Image H, the highlighted island needs two adjacent islands with water, currently there is only one. Therefore, the remaining adjacent island must have water and we place a  $w$  on it.

**Image G**

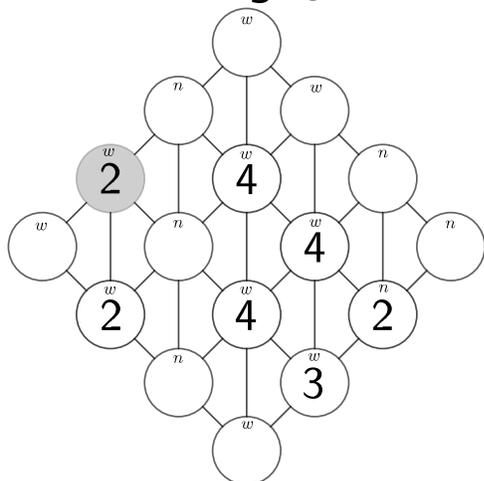


**Image H**

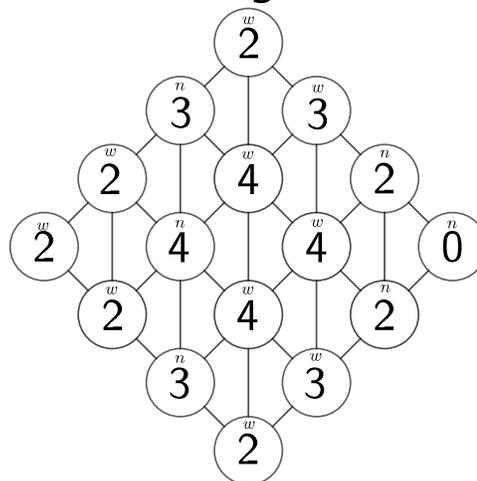


In Image J, the highlighted island needs two adjacent islands with water, currently there is only one. Therefore, the remaining adjacent island must have water and we place a  $w$  on it. We have now placed letters on all islands. In Image K, we replace all original numbers and keep all the letters. We check each island and verify the solution. We will leave this as an exercise for the reader.

**Image J**



**Image K**



**Connections to Computer Science**

This task concerns logic and inference. The logic in this problem is to understand that, for example, an island marked as 0 means that none of its neighbours has water. From this fact, we can infer further facts, and build up a solution to the larger problem. The method of building a solution using inference is what is called a bottom-up algorithm: we start with a solution to a very small part of problem (the "bottom" of the problem) and then build up larger and larger solutions until we have solved the entire problem (the "top" of the problem).

