



18 Christmas Tree Farm

Author: Tim Kunt (Zuse-Institute Berlin)

Challenge

On the wish lists that are sent to Santa Claus, it is not uncommon for a Christmas tree to be requested. Therefore, Anna the gardener elf is responsible for growing them. Since the climatic conditions at the North Pole make outdoor cultivation impossible, Anna is provided with a room in Santa's workshop that has been built specifically for this purpose. Its square floor plan is divided into 7×7 small tiles, with a water basin located exactly in the center.

Each of the 49 small tiles must be used either for a Christmas tree or for water supply. Every Christmas-tree tile must directly border at least one water tile (i.e., share an edge with it). All water tiles must be connected (i.e., from any water tile one must be able to reach any other water tile by a sequence of water tiles in which each pair of consecutive tiles shares an edge). The central tile is a water tile.

What is the maximum number of Christmas trees Anna can plant at the same time under these conditions?

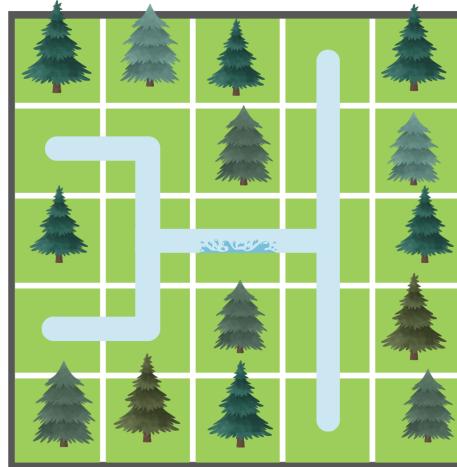


Figure 1: Planting of a 5×5 room under the given conditions.

Note: Figure 1 shows an example of how the maximal number of Christmas trees can be planted in a 5×5 room under the given conditions.

Possible Answers:

1. less than 20
2. 20
3. 22
4. 23
5. 24
6. 26
7. 27
8. 28
9. 30
10. more than 30