A hunter gets caught in a bear trap in the middle of a forest and needs to signal for help. He writes a note and ties it to an arrow, which he plans to shoot out into the forest. Unfortunately the forest is infinitely large, so to have any hope of being rescued he needs to ensure that the arrow will never hit a tree, regardless of how long it flies. Assume all trees are uniform and spaced like a grid, with the hunter at the origin. In the example below, the trees lie on the integer lattice.

Possible Questions to Investigate

1. How thick do the trees have to be for the hunter to lose all hope (i.e. the hunter is no longer able to call for help)?

2. What if the trees were arranged differently? For example, instead of lying on \( \mathbb{Z} \times \mathbb{Z} \setminus \{0,0\} \) they were centered on \((2\mathbb{Z} + 1) \times (2\mathbb{Z} + 1) \cup \{0\} \times (2\mathbb{Z} + 1) \cup (2\mathbb{Z} + 1) \times \{0\}\). 

3. What if the trees were squares instead of circles? What about other shapes?

4. What if the forest were only finitely large, that is, the arrow need only travel a certain distance to escape the forest?