Treasure Hunt Assignment (Nrich Live Problem)

The treasure has been hidden somewhere where the grid lines intersect (cross).

Input coordinates to help find the treasure with the fewest guesses. The interactivity

https://nrich.maths.org/problems/treasure-hunt?tab=overview

gives you the shortest distance you must travel (along the grid lines) to reach the

treasure.

1. Can you find a reliable strategy for choosing coordinates that will locate the

treasure in the minimum number of guesses?

This is my strategy:

I. For the first time, you choose a corner coordinate for example: (0,0)
II. next for example your answer is (6 steps away) you mark all the possible places where the treasure can be.
III. Choose a number on the edge, for e.g., 0,6, this way no matter how many steps it will give you, you will always find the treasure in the next guess.

2. How do you know that your strategy will always work?

I played a few games, and they all went the same, and I got the treasure in 2 or 3 steps. If you get the treasure in 1 or 2 moves – that is a lucky guess!

3. Can you explain your strategy for Level 2 now? Is it same or different from

Level 1?

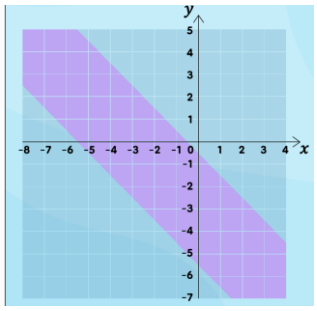
It's like Level 1, but with negative numbers. You just choose a corner coordinate and repeat the steps all over again.

4. Can you explain your strategy for Level 3 and 4 now? Is it same or different

from Level 1?

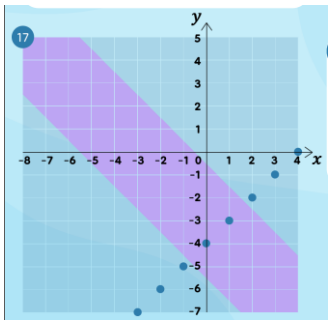
For level 3, it is kind of different. Here is the strategy:

I. First, you chose the corner coordinate of the purple region:

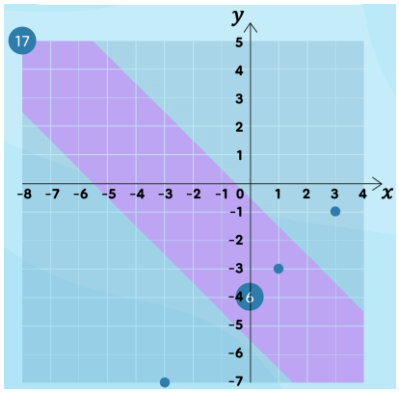


For example, in this slanting purple area grid, you may choose –8,5 which is inside the purple region.

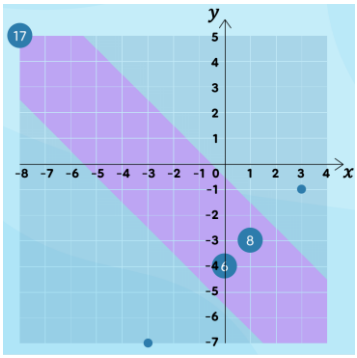
Here is the result:



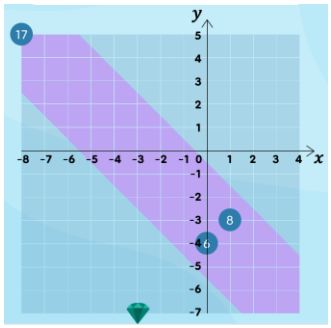
II. So, we got 17, now we choose 1 of the possibilities inside the purple region. The possibilities are the blue dots in the grid.
Now, let us try 0,-4:



We are left with 2 possibilities outside the purple region. To narrow down this, you choose the next blue dot in the purple region – 1,-3:



III. Now, the answer has narrowed down to only 1 possibility which is –3, -7:



IV. Here we have found the treasure in 4 moves. This works in any way the purple region is placed.

For Level 4, the strategy I tried is way different than the other levels. With the other levels, I tried to go for corners as my first guesses, but in Level 4, I think the center is the best for the first guess – 5,5,5

Once I know how many steps away, I am, I take it axis-wise, for eg if it says that I'm 3 steps way, will concentrate first on x axis and move only few steps in either direction, if the number of steps is getting lesser, then go to the next axis – y and follow similar for the z axis. When you are on the z-axis, and you get 2 same steps away saying that the treasure is 2 steps away, you take both of those numbers and try possibilities by adding and subtracting (like x+/-2, y+/-2, z=/-2, x+/-1y+/-1, x+/-1z+/-1, y+/-1z+/-1).

This is not a perfect strategy, and I did not always get the guess in less than 5, but it is the most accurate strategy I could find.