

1. In the worse case, how many guesses would our guessing game take to get the right answer if we had no hints at all? Explain.

It would take us ten tries with no hints, as we would have to individually try each number from one to ten.

2. In the worst case, how many guesses does it take to get the right number if we get a hint of "higher or lower" when guessing numbers 1-10 and guess intelligently (always picking in the middle of the remaining set of numbers)?

If we're given the higher or lower hints, we would divide in half the remaining numbers that could be correct continuously until we reach the correct number. For example, we start with a range between one to ten. Let's say we start with guessing five, then the hint lets us know if the number is higher or lower. This lets us eliminate half of the numbers that could be the correct one. If we guess the middle number between what's left again, then the number of possibly correct numbers halves again, continuing until we reach the correct number. In other words, this is called a binary search algorithm. Mathematically, this would be represented as: $\frac{N}{2^k}$, where N = quantity of numbers to guess from, and k = number of guesses/iterations required to guess the correct number. So, if we solve for k , the mathematical representation of this guessing game would be: $k = \log_2(N)$.