Q1- What is the total possible size of agent’s search space.

Answer;

Search space for the vacuum agent at depth of 10 is going to be 12207031. Below table shows search space on each depth and total can be found by adding each depth’s search space.

|  |  |  |
| --- | --- | --- |
| Depth | Search space |  |
| 1 | 5 +1 (1 is from parent node) | 5^1 |
| 2 | 25 | 5^2 |
| 3 | 125 | 5^3 |
| 4 | 625 | 5^4 |
| 5 | 3125 | 5^5 |
| 6 | 15625 | 5^6 |
| 7 | 78125 | 5^7 |
| 8 | 390625 | 5^8 |
| 9 | 1953125 | 5^9 |
| 10 | 9765625 | 5^10 |
| Total | 12207031 |  |

Q2-Assuming the agent begins the depth-limited search given the initial state shown in Figure1, and uses a depth limit of 10, will the agent find a sequence of actions that will lead it to the goal state? If so, state how many actions will be in the solution? If not, explain why not.

Answer;

If agent starts at given state with all 4 spaces are filled with dirt it will find the solution at the depth 10. There will be 10 actions in the solutions.

|  |  |
| --- | --- |
| Suck, up, right | Suck , up, right, down |
| Suck, up | suck |

Q3- If the agent was solving a 4x4 instance of the Vacuum World, how would that affect the size of the agent’s search space?

Answer;

Search space can increase by (height \* width) ^ actions. Each dirty area will add 5 actions we can say 4X4 area may increase search space approximately 256^5 states